

# Psychological Bulletin

EDITED BY

SHEPHERD I. FRANZ, GOVT. HOSP. FOR INSANE

HOWARD C. WARREN, PRINCETON UNIVERSITY (*Review*)

JOHN B. WATSON, JOHNS HOPKINS UNIVERSITY (*J. of Exp. Psych.*)

JAMES R. ANGELL, UNIVERSITY OF CHICAGO (*Psych. Monographs*) AND

MADISON BENTLEY, UNIVERSITY OF ILLINOIS (*Index*)

WITH THE CO-OPERATION OF

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## ASSOCIATION NUMBER

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THE  
PSYCHOLOGICAL BULLETIN

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PROCEEDINGS OF THE TWENTY-FOURTH ANNUAL  
MEETING OF THE AMERICAN PSYCHOLOGICAL  
ASSOCIATION, CHICAGO, ILLINOIS,  
DECEMBER 28, 29, 30, 1915.

REPORT OF THE SECRETARY, R. M. OGDEN, UNIVERSITY OF KANSAS.

The American Psychological Association held its twenty-fourth annual meeting at the University of Chicago on Tuesday, Wednesday, and Thursday, December 28, 29, and 30, 1915. The general program was conducted in rooms of the Law Building, conveniently situated and well adapted to the needs of the occasion.

The sessions were well attended. One hundred and two names were registered, while it was estimated that one hundred and fifty to two hundred participated at times in the various meetings. The program embraced some seventy titles, a much larger number than ever before. Among the titles listed, those bearing upon various phases of mental tests were most largely represented. Of these there were twenty-two. Next in order of topics came experimental psychology with thirteen titles, then eight each on animal and educational psychology, seven on general psychology and two each on social and abnormal psychology. The remaining titles embraced the discussion on the relation of psychology to science, philosophy and pedagogy, and also included several papers related to the laboratory. Only four whose names appeared on the program were unable to be present.

A special feature of the program was the session of Wednesday forenoon, December 29, which was devoted to a discussion on the Relation of Psychology to Science, Philosophy and Pedagogy in the Academic Curriculum. Pursuant upon a resolution adopted at the last annual meeting, the Committee on the Academic Status of Psychology proposed this topic and nominated the leading speakers.

Mr. Dodge, who was to speak on the relation of psychology and science, was unfortunately detained at home by illness. The remainder of the program was carried out as scheduled: the relation of psychology and science being presented by Mr. M. F. Meyer; the relation of psychology and philosophy by Messrs. Gardiner and Ogden, and the relation of psychology and pedagogy by Messrs. Judd and Haggerty. In the informal discussion which followed, the chief topic of interest was the latter relationship, and led to an interesting debate upon the significance of psychology as a fundamental study in the training of teachers. At the close of this session opportunity was afforded Mr. Dunlap to present the results of a questionnaire concerning psychological terminology. A resolution bearing upon this was introduced at the business meeting, as will be mentioned below.

The apparatus exhibit, which was placed in a room adjacent to those used for the regular meetings, aroused much interest. In addition to a large collection of standard apparatus and teaching materials offered by the C. H. Stoelting Company of Chicago, the following among the many pieces of new apparatus exhibited and demonstrated by members of the Association may be mentioned: A collection of instruments and charts, by Madison Bentley of the University of Illinois; the Johns Hopkins Chronoscope by Knight Dunlap of the Hopkins; the exposure apparatus of C. L. Hull, University of Wisconsin, offered by Joseph Jastrow; the constructive ability test of T. L. Kelley, University of Texas, offered by the secretary; a recorder for tapping, and a portable tachistoscope and memory apparatus by H. L. Langfeld, Harvard University; the peg form boards of J. E. W. Wallin of St. Louis.

The annual dinner of the Association was held at the Quadrangle Club, Wednesday evening, December 29. Ninety-two covers were laid. Following the dinner, President Watson read his address entitled: "The Place of the Conditioned-Reflex in Psychology." A general smoker and informal social gathering then engaged the participants until a late hour.

Thanks to the efforts of Mr. Carr, the local member of the Executive Committee, and the cordial coöperation of members from the departments of psychology, education and philosophy, the appointments for the various events of the meeting were admirable, and those in attendance were heartily welcomed and their needs fully provided for.

Upon the invitation of Dr. William Healy, of the Cook County



Juvenile Court, about forty members of the Association visited the Court's Detention Home on Friday morning, December 31. An informal discussion of the work with juvenile delinquents was engaged in, followed by a delightful luncheon served at Hull House, in which Miss Jane Addams participated. In the afternoon the members of the party were permitted to sit with Judge Merritt W. Pinckney at a very interesting session of the Juvenile Court. The occasion proved highly enjoyable and profitable to those who attended, and an informal vote of thanks was extended Dr. Healy and his associates for this considerate hospitality.

Record should also be here made of the joint session arranged in coöperation with the officers of the Association by Section VIII (sub-section, "Sociological Medicine") of the Pan-American Scientific Congress. This session was held at the Raleigh Hotel, Washington, D. C., Monday, January 3. Appearing on the program were names of the following members of the Association: G. Stanley Hall, William Healy, H. H. Goddard, E. E. Southard and Lightner Witmer.

#### TRANSACTIONS AT THE ANNUAL BUSINESS MEETING

The annual business meeting of the Association was held at 3:30 p.m., December 29. Some sixty members were in attendance. The reading of the minutes of the previous meeting being dispensed with, the President called for reports from the standing committees of the Association. The first to report was the chairman of the committee on the standardization of mental measurements and tests, Mr. Yerkes. The committee has been reorganized during the past year, and the following work is either in progress or definitely arranged for: (1) Woodworth and Wells propose to revise their work on association; (2) Pillsbury proposes to continue the study of means of measuring the intensity of liminal sound; (3) Baird and his associates will study methods of training in the use of introspection; (4) Yerkes and his associates will attempt to perfect methods for studying comparatively ideational types of behavior. As a sub-committee, Watson and Lashley will work on the applications of the reflex method in human psychology. The report was accepted and placed on file.

The chairman of the committee on teaching experiments, Mr. Bingham, offered no report. The chairman of the committee on psychology and medical education, Mr. Franz, recommended that this committee be discharged, since the work it was expected to do

has been accomplished. A motion to this effect was carried. In the absence of any other member of the committee on prizes, the president, a member *ex officio*, made the alternative suggestions of reorganization or the discharge of the committee. It was moved and carried that the committee be discharged.

Owing to the absence of Mr. Warren, chairman of the committee on the academic status of psychology, Mr. Judd made some informal remarks from data furnished him by the chairman, and offered for distribution, in printed form, the committee's report of this year on the academic status of psychology in the normal schools. This report, a very thorough study of the situation, was prepared largely through the coöperative efforts of Miss M. F. Washburn and Mr. B. T. Baldwin. It is the chairman's intention to distribute copies to each member of the Association. The resignation of Mr. Warren from the committee was tendered and reluctantly accepted. It was voted to continue the committee with the special instruction that it coöperate with the committee of fifteen of the Association of University Professors in matters concerning academic freedom and academic tenure. The Council was furthermore empowered to reconstitute the membership of the committee as might be found necessary. In the absence of any member of the committee in charge of the San Francisco meeting of the Association, which took place at the University of California, August 3 and 5, and at Stanford University, August 4, Mr. Yerkes, who had been in attendance, volunteered a few remarks. The proceedings of these meetings have already been published in the *PSYCHOLOGICAL BULLETIN* (12, 313-332).

The committee on nominations was next called upon for its report. Mr. Woodworth, chairman, responded. It will be remembered that at the twenty-first annual meeting in Cleveland, a resolution was adopted suspending the provisions of the constitution as regards the election of officers for a period of three years. During this time a nominations committee was provided to canvass the membership and prepare a ticket for president and the vacancies upon the Council which should be presented for ballot at the annual meeting. It was also provided that a committee should report at the expiration of this term upon the working of the plan, and propose a constitutional amendment, if such were deemed desirable, to fix the mode of procedure at future elections. The present committee on nominations having been entrusted with this additional task, introduced their proposals in the following resolutions:

1. *Resolved*, That Article II of the Constitution be amended by striking out the words, "shall nominate officers for the Association."
2. *Resolved*, That Article III be amended to read as follows:

## ARTICLE III

*Officers*

"Section 1. The secretary of the Association, who shall also be its treasurer, shall be nominated by the Council and elected by the Association at an annual meeting, and shall serve for a term of three years.

"Section 2. The president and two members of the Council shall be elected annually by the Association, a nominating ballot and an election ballot being successively cast by mail under the supervision of an election committee. Election shall be by plurality in the election ballot, or, in case of a tie, by a majority vote of the annual meeting.

"Section 3. In case of the death, disability or resignation of any of these officers, the Council shall appoint a successor to serve until the next annual meeting of the Association. Vacancies existing at the time of an annual meeting shall be filled by vote of the meeting."

3. *Resolved*, That the following By-law be adopted regulating the procedure of elections:

"The election committee shall consist, except as an annual meeting may otherwise direct, of the retiring president, chairman, and the two other members of the Association who shall have most recently held the office of president. At least two months before the date set for the annual meeting, this committee shall issue a call for the nominating ballot, which ballot it shall count forty days before the annual meeting, and shall thereupon report to all the members the names receiving a large number of votes, including at least two candidates for president and at least four candidates for the office of member of the Council; and at the same time it shall call for the second or election ballot, which it shall count fifteen days before the annual meeting, and report the election at the meeting."

4. *Resolved*, That the plan embodied in the above proposed amendments shall be in force for the coming year, the provisions of the Constitution regarding the election of officers being suspended for that period.

The report was received by the Association, and later adopted as read. The constitutional amendment included is therefore before the Association for final disposition at the next annual meeting.

This committee also reported upon their recent canvass for nominations. The following ticket was placed in nomination: for President, Mr. Raymond Dodge, of Wesleyan University; for one member of the Council, Mr. H. A. Carr. As a second member of the Council, the names of Messrs. Dunlap and Hollingworth were proposed. The secretary was instructed to cast the ballot of the Association for the election of Messrs. Dodge and Carr. Ballots were then taken upon the nominations of Messrs. Dunlap and Hollingworth, the result indicating the election of Mr. Dunlap.

The following items of business reported by the Council were then acted upon:

I. The invitation of Mr. Woodworth, on behalf of the department of psychology of Columbia University, to hold the twenty-fifth annual meeting of the Association in New York City was accepted, subject to revision by the Council if necessary. It was understood that the meeting would occur during "Convocation Week" in affiliation with the American Association for the Advancement of Science.

II. The nomination of Mr. Woodworth as representative of the Association on the Council of the American Association for the Advancement of Science was ratified, and the selection of Mr. H. L. Hollingworth as local member of the Executive Committee was announced.

III. It was moved and carried that this year's practice of printing the abstracts, so far as possible, in advance of the meeting, in order that they may be available for distribution among the members present, should be continued.

IV. To avoid in future congestion of the program, due to an over-supply of titles, it was recommended that the Council be authorized to appoint three members annually to serve as a program committee; this committee being empowered to select from among the titles submitted those papers to be read, and those to be listed by title only, due consideration being given to the number of papers offered, the character of those desired to constitute an evenly balanced program, and the restriction, if necessary, of papers by non-members and more than one paper by one person. The recommendation was adopted, and the Council reported the membership of the program committee of 1916 to consist of Messrs. Bentley, Whipple and the secretary.

V. The Council recommended that the secretary be instructed to secure from members additional information concerning the following: (1) their degrees, together with the names of institutions by which the degrees were conferred; (2) the institutions they are serving, including their official titles; (3) their subjects of instruction (*e. g.*, psychology, philosophy, education, etc.); (4) their subjects of research (*e. g.*, general psychology, experimental psychology, educational psychology, animal psychology, tests, etc.). The information is to be filed, and when collected in sufficient amount will be incorporated in the Year Book. The recommendation was adopted.

VI. The treasurer's report was read, as printed below, and accepted. The following appropriations were recommended by the Council and approved by the Association: In connection with the 1915 meeting, amounts not to exceed \$25 for the smoker and incidental expenses, \$25 for the apparatus exhibit and \$20 for the printing of abstracts; In connection with the 1916 meeting, amounts not to exceed \$25 for the smoker and incidental expenses, \$25 for the apparatus exhibit, \$25 for the committee on nominations, and \$20 for the printing of abstracts. The treasurer reported a budget of approximately \$525 for the year 1916, and a probable deficit of \$200. It was voted that the Council be empowered to withdraw \$200 from the principal funds of the Association to meet such a contingency. The principal funds of the Association, now invested in the Union Dime Savings Institution, are \$2,646.74; this amount having been designated as such by action of the Association taken at the sixteenth annual meeting, 1907. The Council was empowered last year to withdraw \$100 from the principal, but was not constrained to do so. The amount of \$100 which was withdrawn, was afforded by accumulated interest.

VII. Upon recommendation of the Council, the following persons were elected to membership in the Association: M. L. Ashley, Ph.D., head of the department of psychology, Chicago Teachers College; G. C. Basset, Ph.D., professor of educational psychology, University of Pittsburgh; Augusta F. Bronner, Ph.D., assistant director, Juvenile Psychopathic Institute, Chicago; A. A. Cleveland, Ph.D., professor of psychology, State College of Washington (Pullman); H. W. Crane, Ph.D., instructor of psychology, Ohio State University; J. E. De Camp, Ph.D., instructor of psychology, University of California; F. D. Dockeray, Ph.D., assistant professor of psychology, University of Kansas; A. S. Edwards, Ph.D., instructor of psychology, University of Minnesota; Ellsworth Faris, Ph.D., associate professor of psychology, Iowa State University; G. A. Feingold, Ph.D., research fellow, Clark University; G. V. Hamilton, M.D., physician and psychiatrist, Santa Barbara, California; Helen B. Hubbert, Ph.D., Johns Hopkins University; T. L. Kelley, Ph.D., adjunct professor of educational psychology, University of Texas; Gertrude Rand, Ph.D., associate in experimental and educational psychology, Bryn Mawr College; Clara Schmitt, Ph.D., assistant, department of child study, Chicago Public Schools; L. T. Troland, Ph.D., Sheldon traveling fellow in psychology (Harvard), Nela Research Laboratory, Cleveland, Ohio; J. L.



Ulrich, Ph.D., instructor of psychology, Catholic University of America; Elizabeth L. Woods, Ph.D., instructor of psychology, Vassar College; A. P. Weiss, M.A., assistant professor of psychology, Ohio State University.

VIII. The secretary reported the resignation of one member, and the death, on October 20, of Dr. William Noyes, formerly superintendent of the Boston State Hospital for the Insane.

Under the head of new business the following items were disposed of:

I. Mr. Judd raised a question as to the Council's interpretation of a statement regarding requirements of candidates for admission to membership in the Association, and moved that it be the sense of the Association that the statement appended to Article I of the Constitution defining "temporary positions" should not be interpreted to include under this head the position of instructor. The motion was seconded and carried. In view of this action it was also moved by Mr. Judd that the Council be authorized, in case it saw fit, to bring additional nominations to membership before the Association at the next morning session. This motion was lost.

II. The resolutions introduced by the Committee on Nominations, and including the proposed constitutional amendments, as previously set forth, were then brought forward and adopted.

III. The following resolution was introduced by Mr. Jastrow:

"The past-presidents of the Association in attendance at Chicago request that the Council be instructed to provide for the next meeting a suitable recognition of the occasion as the twenty-fifth annual meeting of the Association."

The resolution was adopted, and the Council later appointed the following committee to make the necessary arrangements for such a commemorative program: R. S. Woodworth, chairman, R. P. Angier, H. C. Warren and the president (Mr. Dodge) *ex officio*.

IV. It was moved by Mr. Franz that a vote of thanks be extended to the University of Chicago, the members of the departments of psychology and education and the management of the Quadrangle Club for the entertainment accorded the members of the Association during the present meeting. The motion was seconded and unanimously carried.

V. Mr. Dunlap introduced a resolution providing that the president of the Association appoint a committee of five to consider the matter of uniformity in the usage of psychological terms; this committee to confer with a similar committee of the American

Philosophical Association, if such be appointed, and report at the next annual meeting. It was furthermore provided that the chairmanship of this committee should be assigned to Mr. H. C. Warren, if he will accept. The resolution was carried.

VI. Mr. Whipple introduced the following resolution which, after discussion, prevailed:

"WHEREAS, Psychological diagnosis requires thorough technical training in all phases of mental testing, thorough acquaintance with the facts of mental development and with the various degrees of mental retardation;

"AND WHEREAS, There is evident a tendency to appoint for this work persons whose training in clinical psychology and acquaintance with genetic and educational psychology are inadequate:

"Be it resolved, That this Association discourages the use of mental tests for practical psychological diagnosis by individuals psychologically unqualified for this work."

VII. Mr. Waugh moved that the collection of data from those who have been administering mental tests be referred to a committee in order that a beginning may be made toward the establishment of norms. The motion was seconded, and an amendment offered referring the matter to the standing committee on mental measurements and tests. The motion as amended was then passed.

VIII. At a subsequent meeting of the Association the following resolution was offered by Mr. Carr.

"Resolved, That the retiring president be empowered to appoint a committee to express the approval of the Association in the establishment of a station for the study of the behavior of primates."

The resolution prevailed, and the president later announced the appointment of the following committee: J. R. Angell, chairman, Raymond Dodge, Stanley Hall, G. M. Stratton and E. L. Thorndike.

#### REPORT OF THE TREASURER FOR THE YEAR 1915.

Dr.

To Balance from the previous year .....	\$2,750.24	
Dues received from members .....	305.75	
Interest from July 1, 1914 to July 1, 1915 .....	94.13	
Sale of monographs No. 51 and No. 53, year ending December 31, 1914 .....	27.92	
Balance returned by retiring Chairman, Committee on Teaching Experiments .....	5.00	\$3,183.04

## Cr.

By Printing and supplies.....	99.00	
Postage.....	25.00	
Telegrams.....	1.73	
Express.....	3.63	
Reprints of Proceedings.....	12.47	
Reprints of President's Address.....	14.38	
Incidental expenses, 1914 meeting.....	33.68	
Expenses, Committee on Nominations, 1915.....	11.29	
Secretary's stipend.....	250.00	
Exchange on checks.....	.70	
Dues, undeposited.....	2.00	\$ 453.88
Balance in Fifth Avenue Bank.....	\$ 68.58	
Balance in Union Dime Savings Institution.....	2,660.58	\$2,729.16
		<u>\$3,183.04</u>

R. M. OGDEN,  
Treasurer

Audited by the Council

LAWRENCE, KANSAS,  
December 24, 1915

## TITLES AND ABSTRACTS OF PAPERS

### GENERAL PSYCHOLOGY

*The Place of the Conditioned-Reflex in Psychology.* (Presidential Address.) J. B. WATSON, Johns Hopkins University.

*The Relation of Psychology to Science, Philosophy, and Pedagogy in the Academic Curriculum.* Special Discussion.

*Psychology and Science.* R. DODGE, Wesleyan University.

Speaking exclusively from the standpoint of the undergraduate college with limited means, I aim to state the problem as it is faced by a majority of the members of this Association. Three fundamental factors operate to determine academic relationships: similarity of subject matter or method, administrative economy, and educational expediency. In a growing science the first factor will change more or less with every important phase of its development. Academic relations that are determined solely on this basis will vary with the development of the science as a whole, or with the particular aspect of the science that is emphasized in any particular institution. Our actual relationships on this basis are manifold. But no one can predict the future. The main requirement is that no relationship should be over-emphasized to prevent the free development of our own systematic problems. If the first factor were the only one the ideal situation would be independence of all close affiliations.

Unfortunately administrative exigencies are often insistent and usually beyond our control. If it is a question of uniting psychology with philosophy or with physiology, I believe the former combination the better. Independence is the only satisfactory condition. The development of a laboratory demands administration like that of the other laboratory sciences. But except for occasional emergencies, psychology cannot properly combine with any other science either in its laboratory or its apparatus. In the small college combination courses are also inexpedient. Special discussion of relevant facts from other sciences should be provided by the psychologist. For the same reasons the use of psychological material by other sciences should not be permitted to interfere with our systematic courses.

With respect to educational expediency, whatever the future may bring, psychology belongs with the humanities rather than with the special sciences of things. Its usefulness is greatest in this group. Moreover the greatest danger to students of psychology will not be ignorance of chemistry, physics or physiology; but their natural if not inevitable speculative evaluation of psychological facts. I know of no other science where a knowledge of the logic of science is more necessary, or where speculative caution is more vital.

With varying emphasis on the different factors, our academic affiliations cannot be uniform. The essential principle that we should collectively insist on is the freedom of psychology to give its own systematic courses, and to develop its own problems irrespective of all extrinsic demands.

*Psychology and Science.* M. F. MEYER, University of Missouri.

*The Relation of Psychology to Philosophy.* H. N. GARDINER, Smith College.

The prevailing relation is due to historical conditions and considerations more or less accidental; in modern times, as well as in ancient, psychology has been largely cultivated and developed by men who were also philosophers. Moreover, the intrinsic relations of psychology and philosophy are, in fact, many and intimate. But there is now a general consensus on both sides that psychology is essentially an empirical science. Admitting this, the logical conclusion is that it should be established in at least our universities and larger colleges as an independent department. Against this no valid objection can be urged on theoretical ground; not the relatively undeveloped state of the science, for it is surely sufficiently advanced in data, purpose and method for its share of the freedom enjoyed by other sciences; nor the supposed uniquely intimate relations of psychology and philosophy, for this uniqueness may reasonably be denied, each having in its own way the most intimate relations with every field of learning and experience. On the other hand, certain advantages would accrue to both disciplines from the separation, as, *e. g.*, in the removal of causes of friction which sometimes now arise within the common department, in the added prestige to psychology without corresponding loss to philosophy, and in taking from philosophy itself one source of its besetting temptation to subjectivism and leaving it free to develop



impartially its relations to all disciplines. A separate department of psychology should not be one-sided, but should concern itself with the natural history and scientific explanation of mental phenomena wherever and however manifested in all their relations. This is a sufficiently vast field for a department and we may reasonably expect that such a department will be established in our larger universities as soon as the extent and importance of the field is recognized. Apart from this ideal relation, much may be done to render tolerable and even mutually advantageous the present situation by not exaggerating difficulties, by democratic administration and by tolerant adjustment of interests. It is desirable that the teacher of philosophy should be trained in psychology and that the teacher of psychology, as of every other subject, should have some acquaintance with the problems of philosophy. In a curriculum where neither subject is required, equal opportunity should be given to both; if either is required it is perhaps preferable that in an elementary form both should be. But neither should be treated as merely propædæutic to the other.

*Psychology and Philosophy.* R. M. OGDEN, University of Kansas.

Psychology is no longer a normal prerequisite to the study of philosophy. The present generation of teachers of psychology are, many of them, untrained in philosophy. They see among the issues of their science applications to commercial affairs, educational procedure, medicine, including the testing of mental deficiency, but seldom the peculiar bearings of psychology upon a theory of life.

The teacher of philosophy levies a very special tribute upon psychology: a tribute which must be paid in coin of the philosophic realm in order that his students may comprehend fully some of philosophy's chief problems. Among these, idealism, based as it is upon a subjective point of view, ranks first. Only through the exercise of introspection, or *psychologizing*—an evaluation of experience as distinct from its conditions resident in physical stimulus and physiological process—does the average student learn to grasp the significance of an *inner* as distinct from an *outer* world.

Instruction in psychology, when it emphasizes the field of consciousness, defining conscious contents and mental activities, lays a natural foundation upon which the teacher of philosophy may build. Spiritualism, as contrasted with materialism; realism, idealism, positivism; all gain their peculiar meaning with reference to a comprehension of experience *qua* experience. The problems of

value, teleology and the like, also find a firmer footing in minds which can distinguish psychological data from the data afforded by the natural sciences.

In the hands of instructors unsympathetic towards, or unenlightened with regard to philosophic problems, this foundation is not given. The objective view of psychology in particular, with its behavioristic leanings, is no better suited to induct the student into the problems of philosophy than is the study of any other science.

Since the demands of philosophy are insistent in the direction noted, it becomes necessary that the teacher of philosophy shall supply his students with the psychology which they have failed to secure before coming to him. If the demand is not realized and fulfilled by those responsible for the courses listed under psychology, we may expect psychological courses, otherwise named perhaps, conducted again by teachers of philosophy who may be ill-equipped to present the subject in its appropriate and well established outlines as a science of mind.

*The Relation of Psychology to Pedagogy.* C. H. JUDD, University of Chicago.

Since the days of Herbart, psychology has been recognized as one of the fundamental sciences on which educational studies must be based. In many institutions the course of training for teachers has been so organized that psychology has been required as introductory to all the other phases of the science of education. Skepticism regarding the value of psychology has arisen in the course of experience on three grounds. First, general psychology is so far removed in its broad statements from the concrete and detailed problems of teaching that the connection has often been hard to trace between psychology as actually taught and the practical needs of the teacher. Second, the immature student has very commonly been given the fundamental science of psychology because of its logical relations to educational theory at a period in his training when he knew nothing of the educational problems themselves. The student has therefore been quite unprepared to use his psychology and has lost most of it before educational applications became possible. Third, the disputes within psychology itself have very largely reduced the value of this science for teachers.

The conclusion of our considerations is that psychology in its present form cannot be used as an introductory course for teachers.

The science of education must be developed by a direct attack upon educational problems. The productive methods of psychological study and experimentation will be carried over by the trained leaders in educational science, but the rank and file of teachers will profit more by experimental education than by the study of general psychology. The fundamental value of psychology will appear in the training which it gives to advanced students of education, especially those advanced students who are going on to research.

Possibly it will be well to use the term "educational psychology" for certain intermediate courses which are implied in these suggestions. Perhaps the term "experimental education" is better.

As a matter of practical organization, courses in psychology for teachers can be given with profit either by students of education who have trained themselves in scientific methods, or by students of science who have become aware of the character of school problems. No one who is not aware of the character of school problems should mix in educational psychology or experimental education.

*The Relation of Psychology and Pedagogy.* M. E. HAGGERTY,  
University of Minnesota.

This discussion will concern itself with the general plan of courses in psychology leading to advanced work in education. In the service of concreteness, an actual rather than a theoretical program will be presented.

The essentials of this program are as follows: (1) Elementary psychology, one semester; (2) experimental psychology, one year; (3) advanced educational psychology, one year; (4) collateral courses in animal behavior, abnormal psychology, social psychology and psychology of religion, one semester each. All courses are electives.

(1) The elementary course follows the lines indicated by such books as James, Angell, Judd, and Pillsbury, consideration being given to the nervous system and its functions. (2) The experimental course covers sensation, especially vision, imagery, memory, learning, attention, reaction, space perception, mental tests, and leads in some cases to a bit of minor research near the end of the year. This course is taken by students who are not looking forward to education, but it also gives opportunity for a student of education to find himself, to try out his interests and develop the technique of experimentation. It also grounds the student more or

less thoroughly in the fundamental facts of psychology. (3) The year of work in advanced educational psychology requires elementary psychology as a prerequisite. The laboratory course is also recommended. It is a lecture, reading, and recitation course covering the range of topics represented by Thorndike's three volumes. The first part is a course in mental development leading to a study of learning processes. This course demands an acquaintance with the literature on instinct, heredity, experimental studies in learning, etc. The latter part of the year's work concerns itself with the literature on individual, sex and race differences. (4) Students are urged to supplement the foregoing courses with work in abnormal, animal, and social psychology, work in the history of philosophy, ethics, etc.

In all this work, the behavioristic point of view is emphasized on the assumption that educationists are interested in human beings as behaving organisms whose behavior is modifiable, and that the behavior in question involves much more than is included in the term consciousness.

*The Present Status of the Methods of Teaching Psychology in the Normal Schools of the United States.* B. T. BALDWIN, Swarthmore College. (A report prepared in collaboration with the Committee on the Academic Status of Psychology.)

At the present time (December first) replies to twelve questions supplemented by reports and outlines, have been received from 120 instructors (100 men and 20 women) in psychology in 116 state and four private normal schools. The median of the average number of hours devoted to psychology in these institutions is 115, with a range of distribution from 40 to 520. In most instances the work is given in the first or second school year, and varies in scope in different fields of training. The predominant fields comprise work in general, educational and child psychology, with occasional courses in animal and experimental psychology, and the psychology of special branches of learning. Most of the fifty-four texts used are modern and with few exceptions the recitation method is followed in class procedure. The average sizes of the classes range from 10 to 80 with a median of 45; the number of classes per instructor per day ranges from 1 to 6 with a median of 3.5.

There is a marked tendency to correlate more closely the psychology with the practice teaching through applications to methods of teaching, observation of children, and occasional experiments

and measurements, though with little reference to measuring scales in different school subjects. Of the 120 instructors 27 report the use of laboratory equipment ranging in value from \$15 to \$2,000, which is used for experiments in general psychology, demonstration, "standard tests," sensory and motor tests, experiments in learning, clinical work and educational tests. In 57 schools students observe and give mental tests, while in 18 observation alone is given.

In the main the work in psychology aims to direct education by laying foundations in psychological principles which acquaint the students with important conscious processes of growing children; to lead to a study of individual differences and to search for the principles involved in the learning processes; to familiarize students with behavior as an expression of consciousness, and to teach students to psychologize.

Among the significant problems evoked by the study are: Is psychology a necessary prerequisite for educational psychology? How far should mental tests take the place of experimental psychology? How may instructors introduce into their work the elements of experiment and elementary research?

*The Present Status of Psychology.* C. A. RUCKMICH, University of Illinois.

Many claim that psychology as a distinct science is now in a very critical period. Philosophers, physiologists, and psychologists unite in denying it in its fundamental principles. On the other hand, the science is receiving greater academic recognition every year in many universities of this country and Europe. But a better index of its present condition is obtainable on the basis of an estimate of its literary productivity. A study of the periodicals published in this country during the past decade was therefore undertaken. To avoid complications with the abnormal conditions of European publications, no foreign periodicals were consulted. Both the quantitative and qualitative aspects of the problem were considered. The statistical results show quantitatively a steady and, for this year, an unusual relative increase in the number of separate investigations published; qualitatively we find more and more stress on introspective analysis. To emphasize this aspect of the situation, the four-fold subdivision of psychological methods which was proposed several years ago has been followed through with a good showing for the method of introspection. A large per-



centage of the results of the year has been obtained by this method. While a number of critics are attacking the foundations of the science, the experimental work is proceeding apace. After all, the older and better established sciences like physics and chemistry are now suffering the same fate.

*The Definition of Sensation.* C. RAHN, University of Illinois.

The modern sensation as the psychical correlate of the process of stimulation of organs of sense may be traced from Plato's *αἰσθητόν*, through Locke's "impressions" and Kant's phenomena, to the fixing of the conception in the earlier experimental investigations of Weber and Fechner. It is the sensation that crystallizes in the later Wundtian psychology: the sensation that is the correlate of the objective stimulus, as over against feeling, which always has a "subjective" reference. Contemporary development has been in two directions: (1) under the influence of an emphasis upon the dependence of consciousness upon "apperceptive" or "central" factors; and (2) under the influence of a conception of dependence of consciousness upon "conative" or "efferent" factors. Under (1) we find two modes of procedure. There is either (*a*) hypostatization of the modifications of consciousness depending upon the apperceptive or the central factor, as "thought element" (Buehler, Woodworth, Ogden), or (*b*) a reference to certain of these modifications as modifications of "sensory" consciousness (Kuelpe, Watt). Under (2) we find parallel tendencies: (*a*) there is an abstraction from sensory consciousness as dependent upon stimulus, though what is abstracted as non-sensory is not "thought" but a "conation" (Stout), or an "attitude" (Binet), or certain feelings curiously reminiscent of the old-time "feelings of innervation" (Wundt); or else (*b*) this aspect of consciousness, while noted, is not abstracted as an "element" and placed over against sensation, but is conceived as an integral part of it (Dewey). Whatever the warrant for these differences in systematic procedure, they all represent attempts on the part of a descriptive psychology to do justice to those aspects of consciousness that are not solely or immediately dependent upon modifications in the stimulation of receptors. The nature of the dependence upon factors other than stimulus is not always satisfactorily outlined. Herrick emphasizes the effect of varying synaptic relations within the subcortical centres through which the afferent impulse passes on its way to the cortex. The lower-level activity is mediated into the cortical

process. The doctrine of specific energies is further to be modified in the sense that the actual sensory consciousness is dependent not only upon the afferent path to the cortical projection center, but also upon the specific synaptic organization within that center (cf. McDougall). This organization may involve predominantly integration with sensory systems or with motor systems of the cortical level, giving us, psychologically, respectively a sensation that is primarily "cognitive," the "bearer" of meaning, of assimilations, of apperceptive integrations, of imageless thought, and a sensation that is predominantly "conative," "impulsive" in character, the "bearer" of the consciousness of "impulse" and of "attitudes."

*A Reconsideration of James's Theory of Emotion in the Light of Recent Criticisms.* J. R. ANGELL, University of Chicago.

The original criticisms upon James's theory of emotion were chiefly psychological in character and involved most often insistence on the contention that emotion is much more than mere organic sensation. Sully, Baldwin and Irons illustrate various phases of this type of criticism. The James theory was often identified with the quite different position of Lange and at times with that of Sergi.

The first wave of criticism from the physiological side set in with the investigations of Sherrington in 1900. The last representative is the recent work of Cannon. These criticisms are on the whole of decidedly more moment than the earlier and more purely psychological forms of attack which were in part based upon misapprehension and in part were irrelevant to the real issue which James undertook to raise. This physiological critique, however, is chiefly directed to questioning the significance of purely visceral sensations and reactions in emotion. James's doctrine is a much wider one than this type of criticism implies.

The outstanding element of importance in James's doctrine is the instinctive character of the emotional reaction, the widespread organic disturbances characteristic of the stronger emotions and the "backlash" effect upon the brain of these motor and glandular disturbances. No evidence has as yet been brought forward successfully to combat the positive parts of James's doctrine. It is, however, in point to attempt a slight revision of his formulation, which will do justice to the various features of emotion other than organic sensation, while at the same time emphasizing anew the essentially instinctive character of the reflex wave set up by the emotional stimuli and reflected back into the cortical activities.

*Concerning the Image.* H. S. LANGFELD, Harvard University.

The purpose of the paper is a defense of the image, not, however, by direct argument for its existence or by a description of its quality, but by enumerating a few of the situations in which it occurs and suggesting its possible usefulness. The existence of the image is, therefore, from the outset assumed as a fact with the hope that what follows will strengthen the assumption. The writer is in full agreement with the positive contributions of the behaviorists, but is not satisfied with the limitations involved. The functional value of the image is emphasized and meaning is defined in terms of action. Attention is directed to the representative value of the image, especially as a cue for definite attitudes, which function it shares with sensations objectively aroused. In order to illustrate the nature and purpose of so-called irrelevant images a description of an experiment in inhibition with a brief account of the introspective results is introduced. The experiment consisted of the inhibition of firmly linked associations such as certain letters in the repetition of the alphabet and numbers in the numerical series. An explanation of the functioning of such imagery through the radiation of motor impulses is suggested. This leads to the question of the relation of imagery to concept. The emotional accompaniment of imagery and its well-known value in æsthetics is called to mind. Finally there are a few words upon the degree of reliability of introspection.

*The Psychological Antecedents of Phrenology.* M. BENTLEY, University of Illinois.

Phrenology, as it was established a century ago by F. J. Gall, contends that mental traits and mental capacities rest upon neural functions, which depend, in turn, upon the constitution and size of separate and distinct organs of the brain. The doctrine derives, in part, from the French psychology of the eighteenth century, and, in part, from the German empiricists and rationalists of the same period. From the one side, Gall was especially influenced by the sensationalism of Condillac, Bonnet and Cabanis, and so ultimately by Locke; and from the other side, by Wolff and the later representatives in Germany of the doctrine of faculties. Although the two sources were not so diverse as they are commonly supposed to be, the one laid emphasis upon the more passive, the other upon the more active aspects of experience. In the union of the two historical tendencies, Gall established a middle course which was well

designed to support his theory of psychophysical dependence, a theory which has exerted a powerful influence upon the subsequent development of the doctrine of localized functions within the brain.

*Psychological Justifications of Punishment.* E. FARIS, Iowa State University.

Like all ancient institutions, punishment has been defended for a variety of reasons. Some of these are ethical and metaphysical but the more important of the recent ones are frankly psychological, being either assertions concerning the original and primary instincts or formulations of the effect of certain experiences, such as suffering, or the sight of it or its contemplation. The great reform in criminal procedure under Bentham and Mill was founded entirely on a psychological principle now no longer considered valid. It assumed that men act from love of pleasure or fear of pain, and advocated the mitigation of the penalty on the ground that a lighter infliction would produce the desired effect, and that it was undesirable to waste the pain. While the fallacy of the assumption is generally admitted, it is noteworthy that most of our American courts are proceeding on this as valid.

A more recent position defends punishment on the basis of the instinct of retribution. McDougall and Sharp have written in defense of this. It is argued that any tendency to contemplate a criminal act without a desire for retribution is abnormal. This view neglects the essential fact that no act is judged in the abstract. Any offense against the moral law is reacted to with reference to the relation of the offender to the one who judges. Any given act committed by a friend, a neutral, and an enemy, respectively, is not one act but three, and is reacted to with great difference in each case. "Eye for eye" is not an instinctive or emotional reaction; it is rather cognitive, restrained, and mathematical.

A third justification of punishment has to do with the assumed innate desire to make atonement, present in the case of the normal offender. But this can be shown to be due to social experience. It is true that in societies where punishment is administered there is such a feeling, but in the non-punishing communities it is entirely absent. Hence it is not a native instinct and cannot be used to justify the very institution that caused it.

Reformation is claimed as a justification for punishment but this is always due to the concrete and social treatment the criminal receives, and not to the abstract and mechanical punishment. If

punishment be necessary, it is a necessary evil with no adequate psychological justification.

*The Crowd: A Psychological Study.* H. CLARK, University of Illinois.

The problem of the psychology of the crowd is not a study either of individual minds or of an hypothetical social "oversoul," distinct from the minds of the members of the crowd. The first conception overlooks the patterning and integration of the individual members, and the second misinterprets the meaning of social organization. In solving the problem, it is not enough to cite a number of alleged characteristics of the crowd. A complete psychological description should include (1) the conditions under which a crowd forms, continues to exist, and finally dissolves, (2) the distinguishing mental characteristics occurring at each stage, and (3) the laws of the patterning of crowdish consciousness in both its temporal and spatial aspects. A psychological explanation should seek, by reference to the principles of mind, to interpret each significant phase of the phenomena examined. If such a plan of procedure is followed, an exposition of the psychology of the crowd may analyze and explain the facts without distorting them, and, moreover, it may be scientific without seeming artificial.

*Reéducation after Certain Cerebral Lesions in Man.* S. I. FRANZ, Government Hospital for the Insane.

1. *Recovery of Voluntary Motor Control in Cases of Cerebral Paralysis.*—When the precentral cortex or the fibers from the cells in that region are affected by hemorrhage or other accident a paralysis results which, if complete, is a hemiplegia. Several so-called irrecoverable long-standing hemiplegics in whom contractures had formed were treated with massage and with passive movements, and it was found that they soon became capable of moving the limbs voluntarily, and that with systematic exercises they gradually increased in motor ability to such an extent that they approached the normal. Assuming the accuracy of the clinical diagnoses with respect to the cerebral lesions, the results indicate the necessity for alteration of the generally accepted views regarding the functions of the cortical "motor" region of the brain.

2. *Reéducation of Aphasics.*—Successful attempts were made to get several aphasic patients to acquire the names of objects, to



read, and to write. The curves of learning show the slowness and the difficulty of learning, and they suggest that new neural pathways, or new neural adjustments, are made in the relearning rather than that the old are utilized. During the course of the reëducation marked fluctuations in ability were found, and these are noteworthy in connection with other previously noted facts regarding the fluctuations in cerebral activity.

*Movement, Cœnesthesia, and the Mind.* G. V. N. DEARBORN, Tufts College.

Laboratory research in psychology has failed to *explain* the mental process. Perhaps far too little time has been devoted to understanding the immediate relations between the body as an organism, at once developer and adapter of the soul, and the mental series proper. We need much more casuistic introspection based on functional anatomy and physiology; recent disclosures demonstrate anew this real need.

The organism by its inherent nature is in universal movement, both active and passive, and continuous both in time and in space. The universal muscular tonus, equilibrium, reaction-basis, the reciprocal innervation of functional antagonists, irradiation; reflexion, volition; mechanical respiration, circulation, digestion, excretion, are conspicuous topics under which the universal organic motion might be examined into. To deny as "unproven," "illogical," etc., the immediate relation of this universal movement with mind is little short of jugglery with the truth, denying the very ground of the whole category Life.

Cœnesthesia is the sensory and subsensory aspect of this universal bodily motion, director of the soul's important business. Its details in every portion of the organism should be known to every psychologist as the very elements of his subject. This sensation-fabric lends the meaning to life because it is in an important sense the dynamic index of our personal evolution and of our adaptation to our kinetic surroundings both spiritual and material. Its reality is in no wise lessened by its partial action in the dark.

The practical educative, prophylactic, and therapeutic values of cœnesthesia are great, but as yet are relatively undeveloped save in just the wrong direction. The new work of the psychopathologists and of the physiologists lends new dynamism to the subconsciousness, to which by integration of the cœnesthesia we

arrive. However much in addition it may mean, the transcendental "over-soul" expresses this phase of the mental process. Only by elaborating this moto-cœnesthetic relationship can psychology become really explanatory and so take her rightful place as queen of the sciences.

*The Etiology of Mongolian Idiocy.* H. C. STEVENS, University of Chicago.

The various theories with regard to the causation of this peculiar form of idiocy are unsatisfactory. These theories are: (1) Maternal exhaustion; (2) pressure on the basal ganglia of the brain by shortening of the antero-posterior diameter of the skull; (3) Mongolianism is caused by agenesis of the cortex. An investigation of the cerebrospinal fluid of thirty-eight cases of Mongolian idiocy shows that the condition is caused by parental syphilis.

*The New Psychological Laboratory of the University of Michigan.* J. F. SHEPARD, University of Michigan.

The laboratory occupies a portion of the new natural science building. The available space is cut into 40 rooms. On the first floor is located a class room, a shop, a research room with light-tight shutters and containing a concrete pier set in a bed of sand, a small storage room, rooms for keeping animals, and a room especially designed for work with the maze and for other work in comparative psychology. The second floor has offices and private laboratories for the staff, a phonetics room, dark rooms and rooms with light-tight shutters and light walls for work in comparative psychology. Nine rooms, including a dark room, shop, olfactory room with exhaust hood, chronometric rooms, etc., for use by the general experimental class are on the third floor. On the fourth floor are a sound-proof room, other connected rooms for acoustics, a series of research rooms and a system of dark rooms in which a clear space over sixty feet in darkness may be obtained. These dark rooms may be used in various combinations and have an optics room with neutral gray walls in connection. The optics room and dark rooms have north windows as well as skylights, all of which are equipped with light-tight shutters.

All rooms are wired so that they can be interconnected through a central switchboard system and also supplied with low-voltage currents from dynamotors and storage batteries. Tubes in the walls and in the floor slab make possible other connections between

several rooms. All parts of the laboratory are well supplied with alternating and direct currents, waste, gas and compressed air.

Lectures to large classes will be given in the main lecture room of the building. The laboratory is located adjacent to the library in which practically all psychological journals are on file.

Facilities for the study of other sides of animal behavior are provided in neighboring rooms belonging to the zoölogical laboratory.

*A Questionary on Psychological Terminology.* K. DUNLAP, Johns Hopkins University.

*The Johns Hopkins Chronoscope.* K. DUNLAP, Johns Hopkins University.

#### STUDIES IN EXPERIMENTAL PSYCHOLOGY

*The Better Retention of Longer Memory Lessons.* R. S. WOODWORTH, Columbia University.

The fact that a long list of nonsense syllables, or other similar lesson, once learned, is better retained than a short lesson of the same kind has usually been explained by the greater number of readings needed for learning the longer lesson, and the consequent overlearning of parts of it. This explanation does not cover the following fact: when, by the method of paired associates, longer and shorter lists are read the same number of times, the longer lists, though giving the smaller per cent. of right responses immediately after the learning, give a decidedly higher per cent. than the shorter lists after the lapse of 48 hours. The long list is found, by a variety of experiments, to act as a stimulus to extra effort, directed chiefly to the discovery of significant connections between the terms to be associated, and these significant connections are better retained than the more superficial "rote" associations that suffice for the temporary mastery of a short and easy lesson.

*The Measurement of Attention.* K. M. DALLENBACH, Ohio State University.

The present study is an attempt at a measurement of attention in terms of the attributive clearness of the cutaneous sensations aroused by an electrical stimulus. The anode was placed at the back of the neck, and the cathode on the dorsal side of the forearm. The electrode upon the forearm consisted of three concentric brass

rings, any one of which could be used as the positive pole. The differences between the areas stimulated by the three rings were supra-liminal.

Two methods were used. In one, the Single Task Method, the observers were asked to direct their attention to the cutaneous sensation and to attend from all distractions. Various distractors were used under this method to compel the lower degrees of attention. While a slight variation of attention occurred as a result, the lower degrees of clearness were not obtained. To this end the Double Task Method was employed. In these experiments two tasks were set to be performed simultaneously. The observers were directed either to attend to the adding of a list of figures which were presented auditorially and to react to all changes within the cutaneous sensations; or, to attend to the subtracting of a given list of figures from a certain starting number and to react to all changes within the cutaneous sensations as before.

Immediately following each experiment, which was twenty minutes in duration, the observers were asked to grade introspectively the clearness of the impressions during the interval. Upon the basis of these introspective reports and the character and nature of the objective work performed, the following conclusions are drawn: First, attention may be measured introspectively in terms of attributive clearness. Second, introspectively distinguished variations of clearness are closely paralleled by corresponding differences in the accuracy of the work performed, in the rate of reaction, and in the degree of precision as expressed by the mean variation. Third, a close correlation exists between accuracy and rate of report. Fourth, as a corollary, the normal type of consciousness is the dual level type.

*Visual Discrimination of Rectangular Areas Illuminated by Varying Degrees of Achromatic Light.* G. F. ARPS, Ohio State University.

The primary aim of this study is to determine the efficiency in the perception of differences in length of areas and to analyze the various factors involved in judgments of two-dimensional space.

The variables (comparative stimuli) were presented alternately with the standard stimulus. Twelve judgments were taken of each illumination for each of three observers. All judgments were based on the variables, "greater," "less," or "equal."

The chief results are as follows: (1) Maximal and minimal discriminative efficiency is found at 2.29 c.p. and 4.74 c.p. illumina-

tion respectively. (2) Equal, plus or minus differences between the standard and variable stimuli are predominantly judged "plus." (3) Contrast effects render the standard stimulus subjectively variable. (4) So far as could be introspectively determined, eye-movements appear to play no rôle in a judgment when the eyes were left "free"; increased eye-movements act as a distraction and decrease accuracy of judgment; inhibition of eye-movements increases accuracy of judgment. All observers agree that the judgment of a variable as "greater" or "less" is based on the absolute value of the variable, independent of any conscious reference to the standard stimulus. A variable judged "greater" or "less" appears to be immediately perceived as an expansion or shrinkage of the variable. It is probable that the immediate revelation of the judgments "greater" or "less" is correlated with the extent of surface stimulation of the retinae.

*An Exceedingly Rare and yet Typical Case of Color-Blindness.*

M. F. MEYER, University of Missouri.

It is practically agreed among psychologists that four colors or chromas are distinguished from all others in the following respect. The largest number of colors of which it can be said that none of them resembles any of the others within the group, is four, and these four are no others than red, green (not Hering's Ugrün, but common green), blue and yellow. I call these four singular colors in order to distinguish them by this name from all others, which are dual in the sense of resembling two of the singular colors. We subdivide the singular colors into two groups of two antagonistic colors each, red-green and blue-yellow. But a different kind of subdivision is forced upon us at the same time. Even in the psychological literature of fifty years ago we find it mentioned that, relative to yellow and red, blue is somewhat similar to green; and likewise red is somewhat similar to yellow, relative to blue and green. This latter subdivision is confirmed by a rare case of color blindness. To the subject in question blue and green are more than similar; they are called the same color, our green appearing often as the less saturated one. And red and yellow are to him the same color, our yellow being often the less saturated one. It seems plausible to say that, at a time when only two chromas existed, Nature vacillated between establishing one type of animals having the dividing point in the spectrum, for the processes of assimilation and dissimilation (in the sense of Hering),



in the (normally) bluish-green region, and a second type having the dividing point in the yellowish-green region. An ordinary two-chromatic subject (red-green blind), when asked to point at the division point in the spectrum, points at the bluish green region; on one side everything appears one color, on the other side everything is another color. The gentleman in question points at the yellowish-green region; on one side everything is one color which he calls, to please you, either green or blue, on the other side everything is another color which he calls, to please you, either red or yellow. He says that he hears people talk about red and green more than about blue and yellow. He does not need more than two names for himself. After some vacillation, Nature has let the former type prevail in evolution. But there is a trace of the latter even in our present normal, four-chromatic color sense, cropping out in the relative similarity of blue with green and of red with yellow.

*The Nature and Origin of Binaural Beats.* J. PETERSON, University of Minnesota.

Binaural beats have usually been explained as due to the common action of both tones in the same ear, brought about by bone conduction. It has been shown that if a sounding fork is held before one ear, without actual contact with the head, the skull may be thrown into vibration. With a specially constructed microphone one can, in such a case, hear the tone by auscultation on any part of the skull.

It is known, however, that there are important differences between binaural and monaural beats. The former are less distinct and shift peculiarly from side to side. It is found, too, that they are harder to count than the monaural beats; that the probable error of their counts is large; and that at certain frequencies there is a likelihood of the number counted being twice the actual number. The extremely short time required for cross-conduction of the wave through the bone cannot account for these differences. When binaural beats are very slow it is found, if the absolute pitch of the primary tones is low, that the shifting of the beats is due to the tendency to locate the sound entirely on the side of the advance phase. The source of the sound thus seems to shift from side to side. That phase differences are thus perceived is now generally admitted. Binaural beats are therefore not real beats, but a shifting of the apparent source of the sound. The possibility of

some degree of bone conduction is not denied, but the effect of such conduction from weak tones is found to be negligible, probably imperceptible. This position is strengthened by results of carefully controlled experiments on a subject totally deaf in one ear. A weak tone conducted through a tube, or along a metal rod, to the deaf ear was not heard at all. When simultaneously with this one, another tone of slightly different pitch was produced at the good ear there was no beating noticed. Two forks, slightly out of unison, held at the deaf ear were not heard, and they produced no perceptible beats. It is well known that inaudible tones may produce audible beats, but these did not even have such an effect.

Binaural beats are evidently to be explained on the same principle as is the perception of phase differences. Both seem to be cortical in origin, while monaural beats likely originate in the basilar membrane. Combination tones, both "subjective" and objective, are in all probability objective in origin to the basilar membrane. For the production of "subjective" combination tones both wave-series must operate in the same ear.

*The Cutaneous Sensitivity of the Tongue as Affected by the Loss of the Chorda Tympani.* S. B. VINCENT, Chicago Normal College.

The tests reported in this paper were made on a tongue in which, due to the loss of the *chorda tympani*, there was no power of taste on the anterior two thirds of the right side. The case was one of many years' standing but the clinical history must be neglected here. Standard tests were made for touch, pain, temperature, chemical sensitivity and two-point discrimination. Different taste substances and common foods were also used to see if identification could be made on a tactual-thermal basis. Series of tests were made on both sides of the tongue to establish thresholds. Simultaneous and successive application of stimuli to the two sides gave material for comparative judgments. In some series where the judgments failed to show equality the intensity of one stimulus was raised or lowered until the two were pronounced equal.

The results showed that the thresholds for touch, temperature and pain were practically the same on the two sides of the tongue, but that the subjective intensity aroused by the stimulation of the sound side was much greater in every cutaneous sense tested. The subject was naïve. When the stimuli applied to the two sides were the same, such responses as these were constantly heard: "They are both warm but the left side is much warmer," "Yes, I

feel them both but you are pressing harder on the left side," "The one on the left is sharp," etc. One explanation of these results which might be offered is that in addition to the loss of taste fibers there was also some small diminution of the general cutaneous supply to the tongue. In the event, however, one would expect to find differences in the respective thresholds of the two sides. Others have observed in similar instances a lessening of the cutaneous sensitivity, and have suggested that it might be a result of the swelling and degeneration of the nerve, or to the toxic products of degeneration. These observers, however, instead of permanent diminution, reported only a temporary disturbance.

The more probable explanation of the results is that the greater liveliness of the sensations arising from the left half of the tongue was a consequence of the presence of the gustatory element which may be aroused by pressure and possibly also by temperature, and that the subjective intensity was more or less a matter of the whole sensory complex aroused, and not entirely an attribute of any single element, however prominent.

*The Nature of the Feeling of Recognition.* E. K. STRONG, JR.,  
George Peabody College for Teachers.

Using lists of twenty rather difficult words it was found that the median free-association reaction-time was 1.33 sec. When this same list was repeated five minutes later the median reaction-time for the word that elicited identical responses in both cases was 1.09 sec. There was a gain, then, of 0.24 sec. in reaction-time to the same word when it called forth the same response on two occasions five minutes apart. The corresponding gain when the intervals were, respectively, one hour and one day, were 0.18 sec. and 0.10 sec. These gains stand in a ratio of 100 to 78 to 44.

It has been found that 72.7 per cent. of twenty words may be recognized by the same subjects used above after five minutes, 57.3 per cent. after one hour, and 28.8 per cent. after one day. These figures stand in a ratio of 100 to 79 to 40. There is here a direct relationship between fading recognition ability as time proceeds and the difference in association-time for the two reactions for the same intervals of time.

We believe that recognition is based on the "ease" with which the nervous discharge passes over the associational pathways, and we believe that this "ease" is measured here in terms of reaction-time. Recognition is then due first of all to the fact that

when an object is seen again it arouses the same associations that it did when it was first seen. The nervous current traverses the same pathways again that it did before. This condition is essential for recognition but it is not the explanation of the feeling itself. The feeling arises as a conscious awareness that the second discharge has flowed with more difficulty than if it had been a discharge to an old familiar object. This ease may be measured objectively to some extent at least in reaction-time. It is estimated subjectively in terms of feelings of strangeness or familiarity.

*Contributions to the Study of Judgments.* J. JASTROW, University of Wisconsin.

The writer has under way a considerable series of studies of judgments of various types: sensory, in terms of specific qualities and of impressionistic totals; æsthetic; moral; logical; and of qualities combined, such as judgments of difficulty, confidence, value. A point of special interest is the variability of such judgments with reference to the type of judgment, the psychological process decisive in the issue, the personality, education, temperament, social station of the judges. A few illustrations of preliminary results in such a comparative study are presented. A further special interest attaches to the determination of agreement and variability of the judges individually or in groups. What shall we mean by agreement? That of an individual with the average seems the most usual interpretation. The results of a study of language sensibility are presented in some detail. These judgments are as complex as any readily amenable to the methods employed; the standard method is that of selecting ten comparable instances and arranging them in order in which they present the judged quality. In the case of the linguistic judgments, this quality is that of offense. A curve shows the measure of agreement in groups of 12, 8, 6, 4, 3, 2 judges. Such a group may be called a jury. The agreement follows a clearly defined law in terms of the number in the group. The limit of this is a jury of 1, or the agreement of an individual with the average. There is further possible the standard of the chance agreement of any person in a group with his neighbor; this is lower, and again in a definite relation. Other characteristics of such judgments are considered, such as the type of judgments in which an objectively correct order is possible, and one in which no such order exists; the factor decisive in the issue, etc.

*A Quantitative Method of Investigating the Evolution of Concepts.*

C. L. HULL, University of Wisconsin.

The material from which a given concept was formed, consisted of a series of Chinese characters having certain common strokes. The rôle of language in the process was taken by a single Chinese word which referred alike to all the characters of any given concept-series. To further approximate actual conditions, twelve concepts were abstracted simultaneously. One member of each concept-series was placed on the drum of an automatic card-exposure apparatus and each exposed for five seconds, the concept name of each character being pronounced at the end of two and one-half seconds, until all were learned. Another member of each of the twelve concept-series then replaced the characters already mastered, and these were learned as before. This was continued until the twelve concepts as a whole or individually had attained any desired degree of perfection. This degree of perfection was indicated by the decrease in the number of promptings required to learn each succeeding set of characters, and also, if desired, by the ability to identify new characters belonging to the same concept-series.

It was found that the curve of abstraction plotted in terms of concrete experiences is about midway between that of learning and that of forgetting for similar material. The method of abstraction is largely that of trial and error. The individual concepts are curiously vague and unrecognizable at first, later become schematic and at length approach perfection in detail. In one study, twice as many errors were made on a recognition test where the concepts had been evolved by proceeding from the complex to the simple as by proceeding from the simple to the complex.

*Estimations of Speeds of Automobiles.* F. E. RICHARDSON, Drake University.

A group of 102 adults, mostly college students, were asked to estimate the speeds of passing automobiles. These machines were driven at given rates of speed along an asphalted street from which other traffic was barred for the time being. Three automobiles, a 1916 eight-cylinder Cadillac, a 1915 Ford five-passenger touring car, a 1913 five-passenger Ford, and an old Excelsior motorcycle were used. The cars were numbered 1, 2, and 3 with large placards, and passed in irregular order and at irregular intervals a given point at which the observers were stationed. The driver of each



car was given a schedule of rates to be maintained, and an assistant in each car recorded the actual speed of the car as it passed the observers. The rates of speed varied from 6 to 68 miles per hour. The tables of estimations of each observer, judging independently, were collected and tabulated and curves were plotted showing the judgments for each of the twenty-nine trips.

The estimations show marked irregularity and variability depending upon the size of the car, its noisiness, the rate at which it passed, the contrast of that rate with one just previous, and the amount and kind of experience which the observer used as a basis of comparison. At high rates of speed the observers were biased by their estimation of the probable maximum rate for such a car, resulting in marked underestimation.

Such a test serves three purposes. It is a valuable class exercise in which every member takes an active part; it affords material for the analysis of a complicated perception and judgment, and from a legal point of view it demonstrates the inaccuracy and variability of such judgments and some of the factors upon which they depend.

Estimations *en route* by automobile drivers and passengers have been collected which reveal an even more complicated judgment. Visual, auditory, cutaneous, kinæsthetic and organic impressions seem to contribute to such judgments.

*The Solution of a Series of Puzzles.* C. WHITE, Indiana University.

The study is essentially an effort to provide in a simple problem the conditions and factors involved in invention; to note and to analyze the methods of response to a novel situation. It is similar to Ruger's study in the "Psychology of Efficiency" in that it is distinctly an effort to analyze the "problem consciousness"; it differs from his study in that the puzzles are a series, much more intimately related than Ruger used, though without sacrifice of novelty. This relation makes it possible to study in the original situation the various aspects of learning, such as utilization of previous experience, transfer, etc.

The puzzles are based upon a simple Japanese puzzle, a block of wood cut into four pieces. Each puzzle differed from the preceding one by an increase of one in the number of pieces. The same general scheme characterized the entire series. Sixty college students, all of whom had received training in the psychological laboratory, attempted the solution of the series in a 50-minute

period. All tentative arrangements of the blocks made by the subjects during the effort at solution, were recorded by the experimenter. These sketches with the time record and introspections provided the data.

The results indicate that a novel situation of apparently extreme simplicity will reveal astonishing individual differences, both in time required for its mastery, and in methods employed. An objective, logical estimate of the difficulty of a situation is not reliable, *i. e.*, Puzzle II seems but little more complex than Puzzle I, yet the addition of a single piece in Puzzle II increases the average time ten-fold. The degree of efficiency in mastery of a novel situation seems to be in direct ratio to the type of analysis employed. The levels of analysis evident in this study range from pure trial and error to complete anticipatory analysis.

*The effects of Distractions on the Discrimination of Sounds.* F. C. DOCKERAY, University of Kansas.

In a recent work on the effect of physical fatigue on mental efficiency I suggested that the sensations of physical fatigue may act as an incentive to greater mental activity and therefore show greater mental efficiency than under normal conditions. I also cited what seemed to be parallels, the increased efficiency caused by outside stimuli that would generally be looked upon as distractions. It has been demonstrated on various occasions that a distracting stimulus presented at the moment of comparison of the length of two lines, for example, is accompanied by increased concentration on the part of the observer and his discrimination is improved.

An attempt has been made in the experiments to be reported to determine whether a continuous distracting stimulus would have the same effect upon attention when the subject is required to discriminate sounds continuously for sixteen minutes. Two types of distraction were used, one a buzzer of moderate intensity placed on the opposite side of the observer from the sounds to be discriminated and the other, a weak induction shock applied to the forearm. The latter varied sharply in intensity at irregular intervals. Otherwise, both distractions were of uniform intensity and continuous.

Seven subjects have been used. Of these four show decreased efficiency with either form of distraction when the distractor is uniform. Generally, when the induction shock increased, even

to the point of being painful, the subject discriminated more accurately, though he generally did not think so. One of the remaining subjects shows little effect one way or the other, except the sudden changes in the shock distractor seem to render him more alert. The remaining two do slightly better under conditions of distraction.

*A Children's Association Frequency Table.* H. WOODROW AND F. LOWELL, University of Minnesota.

A table showing the responses of one thousand children, nine to twelve years of age, for each of one hundred and twenty words. The Kent-Rosanoff list of one hundred words was used, and on account of the difficulty of some of these, twenty additional ones, making a total of one hundred and twenty thousand associations that have been tabulated. By comparing our results with those given in the Kent-Rosanoff table (obtained mainly with adults), a very complete picture is obtained of the differences in association between children and adults. These differences are very pronounced, even in the case of the twelve-year old children. A few typical illustrations is all that can be presented in the present paper.

*An Experiment on the Influence of Training on Memory.* E. A. COWAN, Wichita, Kansas.

Children of high school age were subjected to training series during which they were required to isolate pairs of units from a mass of homogeneous material (words or nonsense syllables) and to hold the pairs successively in the focus of attention. At the beginning, at the end, and in the middle of the training series the children were required to stand in front of a table holding thirty-two objects, to learn these objects for two minutes, and then to go into another room and write down all the objects they could remember. At the beginning and at the end of the training series they were given a rote memory test with a prose paragraph. The results of the table tests and the rote memory tests were compared with those of another group of children of the same age who did not take the training series, but who were given the table and rote memory tests simultaneously with those who took the training series.

#### STUDIES IN ANIMAL PSYCHOLOGY

*Provision for the Study of the Monkeys and Apes.* R. M. YERKES, Harvard University.

Experimental studies made by the writer and other investigators have abundantly indicated the scientific importance of

thorough investigation of the behavior of the monkeys and anthropoid apes. The writer has devoted considerable time to a consideration of suitable provision for such research and has especially studied the problem of satisfactorily locating a station for such work. In view of all available evidence it seems highly probable that many of the species of monkeys and apes can be kept and bred fairly successfully in Southern California. It is hoped that at no distant date a station may be established at which investigations may be undertaken to be continued uninterruptedly with animals whose ancestry, as well as their life-history, is a matter of accurate record. The advantages of work under such conditions, in contrast with that possible in or about the habitat of most of the monkeys and apes, warrant the expectation of results of great value to the various biological sciences.

*A Demonstration of the Dog's Deficiency in Detail-Vision.* H. M. JOHNSON, Nela Research Laboratory, National Lamp Works of General Electric Company.

An English bull terrier which had failed to learn to distinguish a striped field from a similar field of uniform brightness was trained in about two weeks to discriminate between two circular fields of different area and pattern but of equal mean brightness. Control tests showed that the patterns were not effective and that the difference in area was effective only in so far as it conditioned a difference in luminous intensity. The threshold for intensity was between the relations of 2.25 to 1 and 1.44 to 1.

The animal was then required to choose a striped field and to reject a similar field of uniform brightness, in circumstances which insured the formation of a sharp image on the retina, under all conditions, of the fields to be discriminated. The animal failed to learn the problem or to show any tendency to improve in 500 trials. Each stripe on the positive field subtended a greater visual angle than the sun's disc subtends at the earth. The experiment was crucial and the conclusion follows that the dog is not sensitive to gross detail in visual objects, and that the deficiency is due to the relatively poor development of his retina. The result was probably predictable from the anatomical evidence compiled by Vincent, and it presents at least presumptive evidence against the presence of pattern-vision in other carnivora and in rodents and ungulates whose eyes closely resemble the dog's in structure, both as refractive systems and in point of retinal development.

*The Effect of Delayed Feeding Upon Habit Formation.* J. B. WATSON, Johns Hopkins University.

The purpose of this experiment was to throw light upon the factors which govern the stamping in of successful movements and the stamping out of unsuccessful movements. According to Thorndike the resulting *pleasure* from a successful act stamps in the reaction. Other investigators hold that the stamping in of a successful act depends upon the principles of *recency* and *frequency* and is not dependent upon the pleasantness or unpleasantness resulting from the activity.

A small experimental beginning was made upon this problem. Two groups of animals (rats), closely similar in age, docility, body weight, etc., were chosen. The problem box used was a modification of the sawdust box. The animal had to learn to scratch under a bank of sawdust, find a small hole an inch and a half in diameter, crawl under the sawdust box, and mount through an opening to a raised floor. Screwed to the floor of the problem box was a small metal food dish covered by a perforated metal disc. The metal disc could be opened from the outside. The experiment was conducted as follows: The animal was put into the restraining cage and allowed to work until the problem was solved. With one group the metal disc was raised immediately upon the entrance of the animal and the animal was allowed to feed until his appetite was appeased. In the other group the metal disc was not raised until thirty seconds *after* the animal had entered the problem box. During those thirty seconds the animals in this group were very active, biting and tearing at the metal food dish, running around the cage, etc. At the end of thirty seconds the metal disc was raised and the animals allowed to appease their hunger.

The learning curves for the two groups of animals were almost exactly identical.

*Maze Studies with the White Rat.* H. CARR, University of Chicago.

The maze when learned is run in kinæsthetic-motor terms. The dependence of this sensori-motor coördination upon the sensory environment in which it is developed was studied by noting the effect of changing such factors as the degree of hunger, cleanliness of paths, intensity and direction of illumination, position and orientation of maze and cage, position of experimenter, and method of handling. Most of these alterations introduced disturbances. A few animals are immune to most changes, and the animals



affected are rarely disturbed in every test. Adaptation is readily secured but any adaptation is acquired only for a definite situation, and it is retained over periods in which other disturbances are introduced. Comparing blind animals with those with vision, the blinds as a rule are less susceptible to the changes, adapt to them less readily, exhibit a greater degree of individual variability, and are more erratic and irregular from trial to trial.

*The Interference of Auditory Habits in the White Rat.* W. S. HUNTER & J. U. YARBROUGH, University of Texas.

The present study concerns itself with habit interference and the indirect bearing of this upon sensitivity to the tone 256 dv. in the rat. The results are in harmony with data previously published indicating the insensitivity of the rat to the tone in question. Simple reactions were used and the mutual relations of the stimuli were known in terms of response.

18 rats (*A*) were trained to turn to the right through a T-shaped discrimination box for the stimulus of hand claps. A turn to the left was made for silence. After learning, each rat was given controls to determine the effective stimulus. Each was also tested first with 256 dv. and then with the buzzer substituted for the hand claps. All ignored the tone, but reacted to the buzzer as to the hand claps. For a period of 30 days: 4 rats rested; 3 (*B*) were trained on going to the left for the buzzer; 4 (*C*) were trained on going left for 256 dv.; 4 were trained on going right for 256 dv.; and 3 were tested on regular series of presentations without any auditory stimulus. At the end of thirty days, each set was tested for retention of the original habit. During the 30 days no rat learned the problem upon which he was trained. The retention tests indicate essentially equal proficiency for all five sets of animals. Poor retention was anticipated in those rats trained in (*B*) and (*C*), if the latter set could hear 256 dv.

If the last of *A*'s curve is compared with the first of *B*'s, great interference is revealed. The first of *B*'s curve, however, is the same as the first of *A*'s, i. e., *B* ranks as a new habit. Were it less than this its curve would start lower. If the rate of the elimination of excess error for *A* is compared with that of a set that has learned *B* (after having previously learned *A*), it will be seen that *B*'s rate is much slower in the last 0.4 of the curve, although the rates are practically identical in the first 0.6.

*Some Experiments on Transfer of Learning.* H. H. WYLIE, Geneva College.

During the year 1913-1914 the writer performed some experiments in the psychological laboratory of the University of Chicago, bearing on the problem of transfer. Our specific purpose was to study transfer between two problems whose differences and similarities could be defined and whose factors could be controlled. The subjects used were white rats. This removed in large degree the complications arising in the ordinary experiments on this problem from the presence of uncontrollable central factors. A problem-box was used whose controlling stimulus was a light. After response had been learned to the light, a sound or pain stimulus was substituted. Or a light or pain stimulus was first used and a sound substituted. The response was kept the same in all cases. The most interesting result bearing on the learning process was the fact that most of the learning curves do not show a rapid initial progress nor a gradual progress throughout the learning period, but an initial period of practically no progress, then a rather sudden or complete mastery of the problem. The results bearing on transfer indicate (1) that it is an advantage in learning the response to one sort of stimulus to have learned first the same response to another sort of stimulus and (2) that any loss due to substituting a different stimulus can be overcome by giving the two stimuli simultaneously for a number of trials.

*The Effect of Strychnine upon Habit Formation.* K. S. LASHLEY,  
Johns Hopkins University.

The influence of many drugs upon sensory thresholds, inhibitory and reinforcing processes, and motor coördination offers a possibility of testing the rôle of such factors as frequency, vividness, and recency in the fixation of the neural pathway. Tests have been carried out upon albino rats with the view to determining the effect of strychnine and caffeine upon the rate of learning the maze. The graphic maze was used to get the records of the number of trials and the time, distance, and number and character of errors in each trial. The drugs, strychnine sulfate, and caffeine (pure alkaloid) were given by subcutaneous injection in 0.1 c.c. of water, 10 minutes before each day's training, and training was continued for five trials per day until three successive errorless runs were made.

The comparison of strychninized rats with controls receiving only water has been continued with very careful control of age, sex, ancestry, and methods of training. Owing to the greater

average weight of the rats in this second experiment the amount of strychnine administered per unit of weight was less than in the first test which probably accounts for the slighter effect of the drug.

The results thus far indicate that: (1) Strychnine in large doses facilitates learning. (2) Caffeine in the amount used probably retards learning. (3) Retention is not affected by these alkaloids. (4) Variations in the effect of strychnine upon different individuals suggest that the favorable effect of the drug is correlated with general motor disturbance as opposed to sensory or emotional changes. (5) No serious after effects of the continued use of either drug has been observed.

*The Effect of Alcohol on the Intelligence of the White Rat.* A. H. ARLITT, University of Chicago.

These experiments were undertaken to determine the effect of large and small doses of alcohol, administered for periods of varying lengths, upon the intelligence of white rats. Alcohol was administered to all groups throughout the training periods. Rats fed two c.c. and three c.c. daily died after a short period.

Maze learning was the problem chosen to test their intelligence. The rats were given one trial every other day. Normal controls raised under the same conditions were run at the same time. Rats fed alcohol average a longer time in the maze and make more errors, both at the beginning and during the latter part of the training period, than normal rats. This was the case in all groups. Records of rats fed alcohol for sixteen days showed more irregularity than those of rats fed for longer periods. Two groups of rats trained in the maze until eight out of ten trials were made without error were then fed two c.c. and three c.c. per day. Only in the latter case was the behavior affected seriously during the first two months. Both sets were longer in the maze and averaged more errors than the normal control set during the last two months of the feeding. These rats were run twice a day.

Male and female rats of all groups have been mated with other rats of the same group and with normals. Only four litters have been produced. Two litters were eaten immediately after birth. Two of the six young in each of the surviving litters were born dead. The remaining four in each litter are now being trained in the maze. The records of both sets show marked irregularities, one rat having failed entirely to learn under ordinary conditions of learning. One of these sets is the result of a mating of an alco-

holized rat fed two c.c. per day for seven months, the other of two rats from a group fed one half c.c. per day for five months before mating.

#### STUDIES IN EDUCATIONAL PSYCHOLOGY

*Research as a Means of Teacher-Training.* G. W. A. LUCKEY,  
University of Nebraska.

From the genetic viewpoint, education may be defined as the vital change wrought in the growing individual through the interaction of determining inner and outer forces, nature as modified by nurture. It is an acquired product which, to be vital, must be worked on and into the inherited complexes, organisms, instincts, feelings, desires, etc., known as nature. At bottom all men are one. It is only in the later developed complexes and instincts that humanity differs. Teaching is the conscious effort of one individual to direct or shape the activities of another. It is vital only to the extent that it gives to the taught greater initiative and self-mastery. In order that the teaching may be intelligent and in harmony with the laws of nature there must be a deeper knowledge of human growth and development. This knowledge is to be gained only through properly directed research in the workshop of life.

To teach or build one must have definite aims, and these aims must be true and realizable. True teaching brings others to see and live what you see and live. The teaching of today is directed toward three different ends or aims. According to the first, the purpose of education is to fashion the individual in the image of the past, usually the best past. According to the second, the purpose of education is to fit the individual, at least in part, to the needs and activities of the present. According to the third, the purpose of education is to develop a man, the best man possible under the conditions; to assist nature through nurture; to enable the individual to find himself; to evolve naturally and rapidly to the highest levels, even to rise above them. To see and appreciate this ideal of education research is necessary.

A study of the mind of the child reveals three important instincts fundamental to intelligence. These instincts are shown through the early desire to know as expressed in the three groups of questions: "What is it?" "Why is it?" "How is it?" Here we have the fundamentals of science, philosophy and art. It is the dominant interest of science to discover the facts; of philosophy to explain and interpret them; of education (teaching) to distribute

and vitalize them. The scientist should not stop with the gathering of facts, the philosopher in interpreting them, nor the teacher in giving for truth what is not truth.

*Some Measurements of the Effect of Reviews.* H. A. PETERSON, Illinois State Normal University.

The purpose of the study is to get some measures of what reviews accomplish under conditions similar to those of school work. The subjects were normal school students in classes of from 45 to 75. The class was divided into two groups of about equal ability determined by means of a prose-substance test. All were then given  $2\frac{1}{2}$  minutes for studying a passage 25 lines long, followed by an immediate recall (written) for which a maximum of 12 minutes was allowed. The aim was to reproduce as much of the substance as possible. In grading one point was allowed for each idea. A week later while one group was occupied with the class work, the other reviewed and re-wrote the passage, the purpose of this re-writing being simply for fixation. Two and one half minutes were again allowed for reading, and a maximum of 12 minutes for writing. In some classes there were three groups, the third group receiving a second review two weeks after learning. Three, four, six, or eighteen weeks after first studying the passage, the final recall which measured the effect of the review came.

The results so far are: After three weeks the one-review group recalls 1.89 times as much as the no-review group. After six weeks the one-review group recalls about 1.33 times as much as the no-review group, and after eighteen weeks the superiority of the former has sunk to about 25 per cent. After six weeks the two-review group recalls about twice as much as the no-review group, and after eighteen weeks the former recalls 1.8 times as much as the latter.

While the reviews here used were undoubtedly thorough, the results probably exceed the most common expectations. While the effect of the review, like that of the first learning, decreases rapidly at first, and later more slowly, a substantial residue remains after the sixth week. All of the results were obtained from the use of a single historical selection of only moderate difficulty.

*The Learning Capacity of Negro Children.* W. H. Pyle, University of Missouri.

In a former study of negro children, it appeared that negro children have about two thirds the mental ability of white children.



In the present study, I have tested the learning capacity of negro children, as compared with white children, by means of a new learning apparatus designed by the writer. The type of learning is that of building up a set of motor associations and coördinations. One hundred and thirty negro children from the fourth grade to the seventh were tested. All the children in these grades were included. The children in a white school were similarly studied. It appears that negro children have three fourths to four fifths the learning capacity of white children. The advantage claimed for this study is that we have eliminated, to a large extent, the effects of experience and environment.

*A Comparison of Deaf and Hearing Children in Visual Memory for Digits.* D. G. PATERSON, Ohio State University.

Four hundred and eighty-one deaf children ranging in age from seven to adults were tested for their visual memory for digits. Each deaf child was tested individually by means of a small portable tachistoscope. This consisted of a box whose inside measurements were  $\frac{1}{2} \times 1\frac{1}{4} \times 15\frac{1}{4}$  inches. An aperture or window on the top side measured  $\frac{3}{4} \times \frac{3}{4}$  inches. Strips of cardboard were inserted in the open end of the box. The top card was then withdrawn, slowly exposing one digit at a time for about one second. There were two exposures of the same number of digits. Series of digits began with two and ended with seven. The score recorded was a plus or minus for each series of digits. Wrong order was counted minus. The digits were printed in blue type and measured  $\frac{1}{4}$  inch in height. After each series had been exposed, subject immediately recorded in pencil on paper what he could remember.

The results are given for deaf pupils orally taught, and for those manually taught as well as for all of the deaf children combined. These results are then compared with the results obtained with hearing children, by Smedley.

The deaf children tested are extremely poor in immediate recall of the digits, not equal at any age to the ability of seven-year-old hearing children tested by Smedley.

To show the effect of the absence or presence of auditory experience the children were grouped according to age when becoming deaf. In general the results indicate that the greater number of years of auditory experience before becoming deaf, the greater efficiency of the individual in visual memory. This proof of the importance of previous auditory experience is also supplemented

by the fact that other tests which do not involve the auditory factor do not show the deaf child to be so handicapped as compared with hearing children.

*The Analysis of Typewriting Habits.* M. E. HAGGERTY, University of Minnesota.

Bryan and Harter called attention to the hierarchy of language habits involved in the learning of telegraphy. They specified three orders of habits, namely, letter habits, word habits, and discourse habits. In his study of the acquisition of skill in typewriting, Book notes all of these as specific habits operating against a background of "general habits." The investigation here reported is an attempt to identify these specific habits somewhat more accurately and to rank them in an order of importance for efficiency in learning. The major part of the work has been to analyze printed matter in order to see what letter combinations occur most frequently. This work begun several years ago has been greatly facilitated by Ayres's publication of "the thousand commonest words in English writing." The Ayres list gives the relative rankings for each of the thousand words in a hundred thousand words of printed matter. Using this as a basis we have evaluated each two-letter, three-letter, four-letter, and five-letter combination. These evaluations have served for a building of practice exercises which enable a beginner to practice from the start the habits which will be most important to him later. They serve also as a measure of the proper adaptability of exercises in the manuals of instruction and even of the construction of machines. In a similar manner, the data derived from this analysis of habits may be of service to learners and teachers of the linotype. One practice sentence derived from this study is as follows: "He sees our earnest men stand fast in the faith and win."

Twenty beginning students were divided into two groups of ten each. One group followed the manual of instruction formerly in use. The other used the new exercises. At the end of six weeks of practice, the group using the improved method were copying unfamiliar matter faster and with fewer mistakes than the group following the conventional method.

*A Study of Transfer in Sensori-Motor Learning.* F. N. FREEMAN, University of Chicago.

The activity studied is mirror drawing, modified in such a way that (1) the hand is concealed, (2) the relation is made more

complex, or more difficult to analyze, (3) there is a possibility of an indefinite number of modifications in the relation between the direction of hand movement and of the image of the pen movement. As a consequence of this possibility of modification it is possible to arrange a number of series of trials, the conditions of each one differing from the preceding series in certain specified ways; and, by studying the effect of certain types of modification upon the amount of improvement, or the reverse, from one series to another, to determine some of the factors in transfer in this type of learning. For example, the apparent direction of the pen movement in drawing a figure may remain the same in two successive series, while the direction of the hand movements is modified; or the direction of the hand movements may remain the same in successive series, while the apparent direction of the pen movement changes. In other cases a modification may be made in both elements. These three types of cases were studied in the present experiment using two distinct orders of four series each. It appears, first, that the speed of learning each series may be facilitated or interfered with by the character of the preceding series; second, that whether there is facilitation or interference depends on the relationship of the two series, which is in large measure independent of the specific nature of either series; and third, that the determining factor is not identity in the movements made, or in the perceptual object to which they are adapted, but a similarity in the type of relation between the hand movement and the perceptual object.

*Preliminary Report of a Study of Handwriting Movements.* F. N. FREEMAN, University of Chicago.

The purpose of this study is the minute analysis of the handwriting coördination of writers of different degrees of development and proficiency, in order to distinguish the characteristics of efficient and inefficient types. Two general kinds of facts are being studied: first, the manner in which the elementary component movements combine in the total movement, and second, the temporal characteristics as indicated by the speed distribution among the various strokes, or parts of strokes, for example, the degree of rhythm. The movements are studied by means of motion picture photography supplemented by a modification of the Judd hand-tracer. Preliminary results indicate that certain aspects of finger, hand, and arm coördination, and also certain types of speed distribution are significant as indices of efficient writing.

*An Intensive Study of the Development of Reading Ability.* C. T. GRAY, University of Chicago.

I. This study is intended primarily to determine the differences between good and poor readers, and to provide corrective measures for the latter class.

II. The subjects are pupils in the elementary and high school of the University of Chicago, as well as college students. In many cases the selection of individuals is made by referring to the results of another investigation which is being carried on in the above mentioned schools. These results are of such a nature that they show clearly the good and poor readers. In some instances it has seemed desirable for the writer to visit the elementary school classrooms and hear the children read. The teacher is then asked to send certain pupils to the laboratory.

III. Three general types of test are being given. These may be spoken of as perception tests, motor tests, and measurement tests. The perception tests include the usual work with the tachistoscope and a test with a modified form of the short exposure apparatus whereby the operator can get the span of attention at any point in connected material of considerable length. The motor problems considered are those of eye-movements, breathing, and vocalization during silent reading. Measurement tests are given for both oral and silent reading.

IV. Some of the points shown by the results are as follows: 1. Some subjects are good in silent reading, but poor in oral reading, or *vice versa*. 2. Very often a child does well in one type of silent reading and very poorly in another type. 3. Children show very large differences in the control of the breathing coördinations. 4. The amount of vocalization of some children is so great that their reading may be spoken of as "inaudible oral reading." In a few cases the breathing curve for such silent reading has been found to be almost the same as that of oral reading.

V. Among the corrective measures which the results indicate would be effective the following may be mentioned: 1. Training in breathing. 2. Training in speed. 3. Training in reading for main points.

MENTAL TESTS

*Technology and the Laboratory.* F. L. WELLS, McLean Hospital, Waverley, Mass.

When it is desired to apply the results of experimental psychology to actual life, that is, to make a technology of them, it is

necessary to know that the experiments properly correspond with the conditions of actual life. Laboratory methods may interfere with this correspondence as they have been thought to do, for example, in experimental phonetics. In typewriting a divergence between experimental and actual life performance has been found. Adams reports it in advertising. The graded tests of intelligence serve to distinguish a certain class of mental defect. On the other hand, experiments on the higher mental processes in other classes of mental disturbance fail to distinguish such persons from normal individuals, or normal individuals from each other, according to the most important characteristics. The difficulty is perhaps with the laboratory conditions rather than with the experimental method. The experimental method can be directly applied to actual life conditions, as is done in business, advertising for example. The technology of mental life should not, however, be based on experiment. It should be based upon the quantitative study of various significant facts and reactions in life such as birth, breeding, home environment, education, sexual adjustments, income and various factors of success. The most important place of experimental work is as a guide to prognosis. The experimental study of any group must be compared with the later careers of that group to make the experiments of service in this way.

*Experiments on Vocational Selection.* W. D. SCOTT, Northwestern University.

A large number of mental tests has been suggested as valuable for vocational selection or for vocational guidance. At the present time there is great need of having these tests tried out in actual practice. It is extremely difficult to find means for checking up the results of tests performed in the interests of vocational guidance, but it is relatively easy to check up the results of tests on vocational selection.

The writer has checked up tests on vocational selection in two ways: first, by testing employees whose ability is known to the employers. Second, by testing applicants and correlating the standing in the tests with the standing after employment. Neither of these methods of testing tests is perfect but both are fairly accurate and are extremely valuable. In securing a rating of the employees, several members of the firm should make independent ratings. There should be a correlation of well above .50 for all the ratings made by the different members of the firm, and there



should be a rating of well above .50 between the combined ratings of the firm and the ratings made by the tests. The writer has been able to secure a correlation of .90 and over between the test ranks and the ratings made by a firm. Since high positive correlations have been secured in half a dozen instances, the method seems satisfactory. It seems probable that there is a high correlation between success "in the field" and standing in the tests.

*Mental and Physical Norms for Efficient Waitresses, Saleswomen, Factory Operators and House Maids.* J. WEIDENSALL, Janesville, Wisconsin.

This paper reports an investigation yet in progress. It represents an effort to establish norms for groups of law-abiding, efficient working women in the tests which were given by the writer to the criminal women of the New York State Reformatory at Bedford Hills. Funds and time have limited the work somewhat, but as many of the tests as possible are being given to the four groups indicated in the title.

We found the work at Bedford ever increasingly to require norms for law-abiding women of corresponding industrial condition and opportunity. The only norms for working women which we could discover were those being established in Cincinnati by the Bureau of Vocational Guidance. As available they represent norms for working girls some five or six years younger than the average woman at Bedford, and included, at least in the form in which we were giving them, only three of the tests we had selected for use at Bedford, *i. e.*, measurements of height, weight and grip. Even so, these Cincinnati norms promised to be so helpful in the estimation of the ability of the Reformatory women to be or to become "efficient working women" that they were forthwith added to our tests.

Meantime, we were convinced that to be safe in our interpretation of our subjects' ability, we must have standards for more of our tests, and that these standards must be based upon the records of women of approximately the same age as the Reformatory group, and of women who had observed the law and succeeded in earning a living in the same range of occupations as they, and under the same complex social conditions as exist in New York City. The outcome is the present investigation.

*Attitude as It Affects Performance on Tests.* A. F. BRONNER, Juvenile Court, Chicago, Illinois.

The study of individuals in the Psychopathic Institute of the Juvenile Court of Chicago, has given us an opportunity of observing the important influence of attitude in relation not merely to learning, but in relation to all performance. By study of the same individual at different times and under varying conditions, we have seen striking differences in the test results—when no explanation other than that of attitude could be found. In many instances, the explanation has not had to be inferred, but had been clearly given by the individual himself.

One can analyze reactions in general behavior and to tests, with sufficient surety to show, in some detail, the various phases of attitude that are elements in the situation and directly affect results. Thus, we have illustrations of deliberate deception, general recalcitrancy, emotional disturbance, under which we enumerate general depression, anger and resentfulness, fear, sheepishness, or feeling of shame, shyness, embarrassment, and homesickness. Then too, there is the general nervous excitement, induced by the desire to achieve a particularly good result.

Bare mention, at least, should be made of the peculiar mental states of the epileptic, and of hystericals, the influence of psychoses, major and minor, the psychic disturbances of chorea, and the mental results of bad physical conditions and of extreme bad habits. Finally, there are instances in which we have different combinations of one or more of these conditions.

*A Percentage Definition of Intellectual Deficiency.* J. B. MINER,  
Carnegie Institute of Technology.

More emphasis should be placed on the description of the border lines of social fitness on measuring scales if we are to avoid current absurdities. In the present dilemma the writer advocates a percentage definition of *intellectual* deficiency. The lowest "X" per cent. would be regarded clearly deficient in intellect and the next "Y" per cent. doubtfully deficient. After consideration of important estimates that have been made, illustrative percentages are suggested tentatively. The purpose should be to include among the clearly deficient those whom society might justly isolate, and in the doubtful group those who would be likely to require both special school training and social assistance during life. The percentage definition supposes that the deficient differ only in degree of ability from those who are passable, that the tests at present detect only intellectual deficiency, that the percentage of deficiency

is practically the same for each age within the range for which testing is important, and that variability would be cared for in the doubtful region.

The tentative formula is then used to describe the boundaries for the immature and the mature on the Binet scale on the basis of test results. The boundary for the mature is found with the random group of 653 fifteen-year-old school children. Besides showing the effect of the percentage definition in readjusting the boundaries on the Binet scale, it is used to test Stern's "mental quotient" and to indicate how the results of different investigations, say in the field of delinquency, might be compared even when they used different scales. The quantitative definition is to be compared for clearness and significance with verbal descriptions, such as that of the British Commission on Feeble-Mindedness. Its usefulness in diagnosis is to inform the expert how far his opinion receives objective support.

*Perceptual Transformations as a Means of Testing Mental Growth.*

D. P. MACMILLAN, Bureau of Educational Research, Chicago Public Schools.

In evaluating perceptual capacity it is usual to limit the procedure to qualifications that tests of "performance" emphasize, viz., amount of work, constancy and accuracy exhibited, and time expended. Stress must also be placed upon the transformations that take place in (a) content, by comparing the product reproduced with what is presented, and in (b) process, or differences evidenced in modes of expressing as compared with ways of acquiring. These changes occurring between getting and giving, should be expressed in terms of transformations or mediation or cross-reference of sense-media. Children as well as adults may be visualizers in receiving, and, for example, acoustic-motors in expressing. Basic transformations are illustrated by the old distinction of primary and secondary qualities of sensations. If the contact-values are the older and the substrate of our mental life, and if human beings must pass through these type-ways of reacting, then determining and rating this gradual transformation ought to enable us to place arrests and retardations within this scale.

*Comparative Rank in Mental and Physical Tests of 14- and 15-Year Old Working Children with 14- and 15-Year Old School Children.*

H. T. WOOLLEY & C. R. FISCHER, Cincinnati Bureau of Vocational Guidance.

The working children of this report are the same group for whose tests details are already published in the monograph on "Mental and Physical Measurements of Working Children"<sup>1</sup> and the paper on a "New Scale of Mental and Physical Measurements for Adolescents."<sup>2</sup> The school children are children from the same community, and as far as possible from the same districts, who were intending to remain in school. They were given the same tests, under the same conditions as the working group. The present comparison of the two groups is based on ten percentile summaries of each of the mental and physical measures used. The school children are superior to the working children in every respect, in mere growth, in manual skill, and in mental ability. There is not a single test, mental or physical, in which the working group is the equal of the school group. On the whole, the difference between the two groups is greater at fifteen years than at fourteen years, though this statement does not hold of every test.

The scale of measurements already published for working children, is accordingly too low for children in general. A scale combining the two groups will soon be ready for use.

*A Census of Speech Defectives among 89,057 Public School Pupils—  
A Preliminary Report.* J. E. W. WALLIN, Psycho-Educational  
Clinic, St. Louis, Missouri.

The census was made in order to obtain data on the following points: the number of stutterers, lisps and other types of speech defectives in the St. Louis public schools; the number of left-handed pupils in the schools; and the following facts concerning each speech defective: sex, age, grade, years retarded, degree of severity of defect, age of onset, ascribed cause, and whether or not the speech defective was or had been left-handed and whether or not he was a dextrosinistral.

Among the results may be mentioned the following: 2.8 per cent. of all the pupils considered were subject in greater or less degree to some form of speech defect; 1.6 per cent. were lisps; .7 per cent. were stutterers; .4 per cent. had some other form of speech handicap; 71.0 per cent. of the stutterers and 78.7 per cent. of the lisps were mild cases; about twice as many boys as girls had speech defects. The percentage of children who were left-handed was the same (2.8 per cent.) as the per cent. who were speech

<sup>1</sup> No. 77, *Psy. Rev. Mon. Sup.*

<sup>2</sup> *J. of Ed. Psy.*, Nov., 1915.

defectives, apparently supporting the conclusion that there is a causal connection between left-handedness and speech defectiveness. Specifically the claim has been made that training left-handed children to write with the right hand will result in the development of speech disorders. Analysis of our data on dextro-sinistrality does not seem to bear out this conclusion and investigation furnishes little, if any, justification for the demand that left-handed pupils must not be forced to write with the right hand on the ground that this will produce speech defects.

*Who Is Feeble-Minded?* J. E. W. WALLIN, Psycho-Educational Clinic, St. Louis, Missouri.

It has been accepted as definitely proved that older adolescents and adults who fail to reach a mentality of thirteen years by the Binet-Simon tests are feeble-minded. When measured by this standard the writer found that every one in a group of poorly schooled adults, consisting of four farmers, one business man and one house-wife, all eminently successful in their several callings, all living moral and respectable lives, and parents of mentally normal and healthy children, would grade as feeble-minded whether rated by the 1908 or 1911 scale. Of five freshmen in a teachers' college and one high-school junior, at least four of whom were superior to the average student of equal training, four would be rated as feeble-minded on the most liberal basis of accrediting by the 1911 scale. These results—and other analyses presented elsewhere—lead to the conclusion that the concept of the high-grade moron, and possibly also of the middle-grade moron, must be abandoned.

The present tendency to play loose and fast with such concepts as "mental defect," "mental deficiency," "defectiveness," "feeble-mindedness," "subnormality," and "morosity" is unjustifiable. There are many degrees and many kinds of mental defect, ranging from a specific defect of memory or a slight degree of mental retardation down through backwardness, dullness, "borderlinity," and the various degrees of feeble-mindedness. Innumerable adolescents and adults are now being diagnosed as feeble-minded on the basis of arbitrary standards which prove to be untenable. When tenable standards are adopted the huge percentages of feeble-mindedness found by Binet-Simon surveys during the last few years among delinquents and adults will suffer collapse. The majority of subnormals are dull, backward and retarded rather than feeble-minded.



*Diagnostic Mental Measurement: A Point Scale for Adolescents and Adults.* R. M. YERKES & C. ROSSY, Psychopathic Hospital, Boston.

The pre-adolescent Point Scale devised at the Psychopathic Hospital, Boston, for the diagnostic measurement of intelligence in hospital patients has now been applied to upward of two thousand individuals, and the results have so far justified the expectations of those who are using it that it seems desirable to offer for use a scale, constructed on the same principles, for adolescents and adults. This, like the pre-adolescent scale, involves twenty tests primarily of the so-called higher or more complex mental processes, for each of which credit is given according to the merit of the reaction. The maximum credit for an examination is one hundred points, and the result of an examination is expressible as an index or coefficient of intelligence, which is obtained by dividing the score made by an individual by the expected score. The latter, in turn, is obtained by reference to norms for the scale based upon the examination of relatively large groups of individuals.

This new adolescent and adult scale is intended primarily for the ages from twelve onward to the limit of intellectual development, that is, approximately sixteen years. It is, therefore, as contrasted with the earlier scale, an adolescent and adult scale. Emphasis should be laid upon the fact that both scales are intended for the making of rough diagnostic measurements in order that individuals may be classified as (a) very inferior, (b) inferior, (c) normal or average, and (d) superior, in intelligence.

*Methods of Studying Ideational Behavior in Man and Other Animals.*  
R. M. YERKES, Harvard University.

The writer's multiple-choice method of studying ideational and allied types of behavior in man and other animals has yielded valuable results as used with ring-doves, crows, rats, pigs, monkeys, and orang utans, children,—normal and defective, adults,—normal, defective, and insane. These results indicate that the method is well worth perfecting in order that comparisons may be made of the chief characteristics of some of the important learning processes in various types of organism.

The multiple-choice apparatus is now being designed in such wise as to render it serviceable, in three sizes, for a great variety of vertebrates; and in attempting to perfect and provisionally standardize the apparatus and mode of procedure, the writer has

found it possible to so plan the apparatus that it shall be valuable, with minor changes, for experimentation by means of the Hamilton method of studying reactive tendencies, the Hunter delayed-reaction method, as well as the Yerkes multiple-choice method. Since these three methods give valuable information concerning the presence and functioning of ideas, it is a considerable gain to comparative psychology to have them available through a single apparatus.

*Mental Tests of College Students, as Freshmen and as Seniors.* K. T. WAUGH, Beloit College.

Seven selected tests were given to 123 members of the freshman class at Beloit in the spring of 1912. The tests were again given to the same persons three years later with the purpose of ascertaining the mental functions that are most developed during the period spent in college. Tests were chosen which would measure functions most diverse and most representative of the subject's status of intelligence. These were: Concentration of attention, speed of learning, retention, quickness of association, ingenuity, range of information and motor control. The results of each of these tests were correlated with the results of all the others, and with the class standings of the freshman year.

The highest positive correlation was found between controlled association (opposites) and class standing. The highest negative correlation was found between motor control (steadiness) and class standing.

During the present year when the tests were applied again to seniors, some of the tests had to be discarded since there was a possibility of the tests in the freshman year influencing the result of the second test. This is true of the ingenuity test, and to a certain extent of the memory test. Many of those tested in 1912 had dropped out of college, and some in the senior class had entered since 1912. There were difficulties about securing the seniors for individual tests; but we present the results from 39 subjects who took both tests, together with the percentage of improvement and the norms found for the whole freshman class.

The latter part of the paper presents a scheme for reducing the results of several mental tests to a uniform basis, enabling the results of the several tests to be combined so as to yield an index of intelligence or mental efficiency. The scale of measurement is comparable with the marking system in vogue in the majority of

colleges. A description is given of an angular scale and sliding rule by which measurements expressed in any scale may be quickly changed to corresponding points in the uniform scale.

*The Distribution of One Hundred College Freshmen in Several Tests.*

K. GORDON, Bryn Mawr College.

A class of young women, college freshmen, whose average age is eighteen years, was put through the following tests: (1) Completion of Terman's "Strength of the Eagle"; (2) deferred memory, being a reproduction of "The Marble Statue" after a delay of forty minutes; (3) star tracing; (4) Hayes's rational process test box; (5) Woodworth's and Wells's substitution test; (6 and 7) Terman's problems No. 3 and 5 in "Genius and Stupidity"; (8) the puzzle of the fifteen matches used in Thompson's "Mental Traits of Sex"; (9, 10, 11) controlled association—a modified form of the Woodworth and Wells opposites, supraordinate and subordinate concepts; and (12) the criticism of a group of syllogisms. The nearest approach to a normal distribution curve was found in the tests for deferred memory, substitution, and supraordinate concepts. The three puzzles proved to be somewhat too difficult, the criticism of the syllogisms too easy. The meaning of the other curves is equivocal. Correlations are being computed between various pairs of tests.

*Psychological Tests as Diagnostic of Certain Individual Differences in College Students.* E. MURRAY, Wilson College.

This paper forms the preliminary report of an experimental investigation into individual differences; especially such as are of vocational importance. Among the problems attacked were: (1) The significance of certain tests as revealing specialized abilities, *e. g.*, in the handling of ideas, symbols, things or people; (2) the relation between the speed of various associative processes, and general or special ability, as shown in college courses or activities; (3) the correlation between learning tests of different types and mental and motor ability as shown in academic and gymnastic records; (4) certain peculiarities in free association responses, and their relation to temperamental or other differences. The principal tests utilized are those of the Woodworth-Wells series, the pencil maze, mirror drawing, the Fernald and other construction puzzles, the Knox cube imitation, and handwriting pairing tests.

*Preliminary Work on the Construction of a Scale of Performance Tests.* R. PINTNER, Ohio State University.

The desirability of having a scale of performance tests in which the factor of language does not enter has led to work on the standardization of about 15 performance tests. The necessity of such a scale in the case of non-English speaking individuals, of deaf mutes and other children whose language is undeveloped, is obvious. It should also prove to be a valuable supplement to the present scales which depend mainly upon language responses. The tests have been collected from all available sources with the addition of some new tests. An accurate standardization of each test is being made in order to find the diagnostic value in each case, since it has been found that specific tests are suitable for certain ages. At the present time a standardization of the following tests has been completed: Feature Profile, Manikin, Five Figure Board, Two Figure Board, Casuist Form Board, Seguin Form Board, Adaptation Board, and Healy's Five Block Frame Test. Results for the other tests are being gathered.

The combination of this group into a scale cannot be made until the standardization of each individual test is completed. At present it would seem that the Binet system of groups of tests for each age is impracticable, since the number of different tests required would be too large. Very probably some method of scoring by points or the computing of the average of the mental ages for each test will prove to be more desirable in computing the ability of the individual.

*A Scale for Measuring Ability in Arithmetic.* D. STARCH, University of Wisconsin.

The scale is designed to measure ability in arithmetical reasoning. It is composed of a series of twelve problems arranged in the order of steps of increasing difficulty. The value of each problem was determined experimentally by a test made upon over 2,000 pupils in grades four to eight in fourteen schools. The steps of the scale are numbered from four to fifteen. Each step contains one problem. The scale is to be used by allowing the pupils as much time as they need to do as many of the problems as they can. A given pupil's score is the highest step passed. For example, if a pupil does all steps up to and including eight and then fails on all the rest, his score is eight. But if he fails on nine, does ten and eleven, and fails from there on, his score will be ten. That is, he receives credit for every step passed beyond the point where he first failed.

*A Comparison of the Binet-Simon Method of Measuring Intelligence with the Yerkes-Bridges Point Scale Method.* J. W. HAYES, University of Chicago.

The comparison is based on the results obtained in the examination, by both the Binet and Yerkes methods, of two hundred New York school children, one hundred each of eight and nine years, of the same race and educational training, taken from a school in the Jewish district of the lower East Side. The children examined formed two age groups, selected only in so far as they represented the proportional distribution of these two ages throughout the different school grades, and included no children who had actually been reported for mental deficiency. The comparison is made, first, directly, between the results obtained from the examinations by the Binet and by the Yerkes methods; second, indirectly, by reference to the school grading of the children (first to sixth grades inclusive); and, third, indirectly, by reference to the results of twenty other tests given to the same children.

*The Distribution of the Feeble-Minded arranged by Mental Age (Binet).* S. C. KOHS, Chicago House of Correction.

This article is an attempt to visualize the distribution of mental deficiency tabulated by mental age and interpreted in the light of the Gaussian curve of normal frequency. The information on which the study is based was obtained from the published data of three institutions (1,000 cases), and from some few community surveys, with supplementations by the author.

*The Standardization of Test Blanks.* E. S. JONES, Cincinnati Bureau of Vocational Guidance.

The following are standardizations of certain familiar test blanks used in the laboratory of the Vocation Bureau of Cincinnati.

(a) An evaluation of the comparative difficulty of seven blanks for the "Opposites test" was made by giving to each of 159 children, 14 to 17 years of age in the upper grammar grades, two of the blanks successively. Ranking the blank beginning 'bad' as 1.00, the ratios of each of the other blanks in accuracy and index time divided by accuracy to it are as follows: 'Good,' .94 and .99; 'Asleep,' .87 and 1.10; 'Inside,' .77 and 1.45; 'Strong,' .80 and 1.75; 'Worst,' .72 and 1.98; 'Wise,' .59 and 2.53.

(b) The second standardization concerns the difference in the difficulty of cancelling given letters on the Whipple small-letter



cancellation blanks furnished by Stoelting and Co.; and also the difference in cancelling the same letters on the two different printed forms. Two of the three letters, 'a,' 'm,' and 'w,' each on a different one of the two forms, were cancelled by 71 children, 15 to 17 years of age, and 53 adults. There were no striking differences between adults and children. The ratios in accuracy and index of each to the other letters are as follows: a to m, .93 and 1.26; a to w, 1.02 and 1.17; m to w, 1.13 and .77.

437 'a' cancellation records, 140 "m" records, and 189 "w" records show that there is no difference in the case of any of the three letters between the two forms so far as accuracy of cancellation is concerned. In the case of index, with the letter "a" there is a consistent indication of the greater difficulty of the "hp" over the "zc" form,—8.3 per cent. for 14-year-old boys, and 6.6 per cent. for 17-year-old boys who had had three previous annual tests. Both of these percents are about a third the respective mean variations. There is no significant difference in the "m" index (1 per cent.); while in the cancellation of w's the "zc" form was 4 per cent. harder,—less than a fourth the mean variation.

*Correlations of Mental Measurements, among themselves, and with School Grade, Physical Ability and Industrial Factors.* E. S. JONES, Cincinnati Bureau of Vocational Guidance.

Intercorrelations were first determined for school grade, average mental ability, and each of 18 measurements of the tests used in the first of a series of five examinations given to working children of Cincinnati by the laboratory of the Vocation Bureau. The subjects were 100 boys 14 years of age, 50 of whom were below and 50 above the average of the total larger group of over 400. The Spearman foot-rule formula was used, and, for the purpose of comparing the difference in the relationship of functions between the low and the high subgroups, an  $R(l)$  and  $R(h)$  were calculated by summing the absolute values of the  $g$ 's, without regard to sign, in each subgroup, and treating these sums separately as usual  $g$ -sums of the same sign where  $n = 100$ . Obviously the mean of  $R(l)$  and  $R(h)$  will in each case be the true foot-rule  $R$  for the entire 100.

Very few strikingly high correlations between test measurements were found. The only function showing consistent, though slight, negative correlations was the accuracy of a routine learning test, which gave 8 minus  $R$ 's out of 17. The average of the mental tests correlated with school grade to the extent of  $R = .33$ . In

general the  $R(l)$ 's were higher than the  $R(h)$ 's, indicating that there is better correlation between functions in the low than in the high group.

A second set of correlations was found between certain important mental-test groups and the following, the average of physical test measurements; job tenure; and average weekly earnings during the first two years of work. Most of the  $R$ 's were small, almost negligible. Job tenure correlates highly with grade (.28), and none at all with physical ability (.002); while the wage rate shows the reverse relationship with both of these factors (.005 and .24 respectively). The average in mental tests correlates only slightly with job tenure and wage rate,  $R = .11$  and .07 respectively; and the highest relationship between either industrial function and a test group is that of .11 for  $R$  between wage rate and immediate memory.

Our conclusion is, that under the present haphazard condition of finding jobs, general or specific mental measurements furnish but little basis on which to forecast either earning capacity or permanency of position during the first two years in industry.

*A Constructive Ability Test.* T. L. KELLEY, University of Texas.

A brief survey of intelligence tests not dependent upon language and little subject to preceding formal training is made. Form board and other constructive tests are mentioned as of this nature, but all fail to test one of the highest evidences of intelligence: the ability to propose adequate problems, ends, or purposes. The need for a test which (1) is free from dependence upon language, (2) is little affected by preceding formal training, (3) does test initiative as well as manipulative ability and (4) is capable of accurate grading and standardization, is pointed out.

The test, consisting of building blocks of such a nature as to offer slight possibility of transfer of training from ordinary building blocks and mechanical outfits, evolved to meet these conditions is then described. Other conditions, not quite so fundamental, are shown to have been met so that the test, as finally devised, may be given to children of a broad range of ages, requires a relatively small amount of time to give (thirty minutes for a fifteen-year-old child), and does not involve elaborate apparatus. The method of giving and grading the test is explained.

Several traits of character revealed by the test are enumerated, as are also the qualifications of the experimenter who is to realize the more subtle of these. The objective grading, based primarily

upon a scale of merit which consists of forty stereoscopic photographs of structures of different degrees of complexity is illustrated. The scaling of these structures, which has been accomplished by the method used in the derivation of such scales as Thorndike's Handwriting Scale, is described. Also the use of the scale, its reliability, and the reliability of its use by an individual.

*Two Spatial Relations Tests, and a Learning Test.* L. L. THURSTONE & W. V. BINGHAM, Carnegie Institute of Technology.

The first "spatial relations" test is intended to give an indication of a subject's ability to think spatial relations involving three dimensions, and is proposed for use in preliminary tests of prospective students of drafting, machine design, architecture, pattern-making and other subjects which call for ability to interpret bi-dimensional drawings in tri-dimensional terms. The mental task set by the test is similar to that of Binet, test No. 2, fifteenth year. The test blank furnishes twenty-four of these spatial relations problems, approximately uniform in difficulty and calling for a negligible amount of motor response. The second test may be called a "spatial inference" test. The blank contains twenty-four syllogisms regarding spatial relations of approximately equal difficulty. The subject is required to check, as right or wrong, the conclusions of these syllogisms.

The "learning" test is a modification of Munn's familiar substitution test. It calls for the association of pairs of letters which are the initial and final letters of the key words, printed at the top of the blank.

PROCEEDINGS OF THE ELEVENTH ANNUAL MEETING  
OF THE SOUTHERN SOCIETY FOR PHILOSOPHY  
AND PSYCHOLOGY, COLUMBUS, OHIO.

REPORT OF THE SECRETARY, L. R. GEISSLER,  
UNIVERSITY OF GEORGIA.

The Southern Society for Philosophy and Psychology held its eleventh annual meeting at Columbus, Ohio, Thursday, December 30, 1915, in affiliation with the American Association for the Advancement of Science. The sessions were held in Page Hall of the Ohio State University. The morning session was held in conjunction with Section L of the A. A. A. S. In the evening the Society entertained at a smoker in Hotel Kaiserhof, to which the members of Section L were invited. The president's address, entitled, "Academic Progress of Psychology in the South," was given at this occasion and it was followed by informal discussions and reports.

The following items were passed upon at the business session held Thursday noon:

1. The place of holding the next meeting was left to the Council for decision. It was suggested, however, that the Society hold a single day session during Christmas week in some Atlantic coast state and then join the meetings of other scientific organizations in New York City. It was furthermore proposed that from 1917 on in alternate years the Society meet in conjunction with other southern organizations, such as the Southern Conference for Education and Industry.

2. The following Amendment to the Constitution was laid before the Society, to be voted on at the next annual meeting: Article I, Name and Object, to read as follows:

Sec. 1. The name of this organization shall be The Southern Society for Philosophy, Psychology, and Education.

Sec. 2. Its object shall be to promote the interests of Philosophy, Psychology, and Experimental Education, in the southern section of the United States by facilitating intercourse among those who are cultivating these subjects, and by encouraging original investigations among its members.

The purpose of the proposed change is to extend membership to all whose interest in philosophy or psychology is mainly due to their research activities in educational fields.

3. The following officers were elected: President, Dr. David Spence Hill, New Orleans, La.; Vice-President, Professor E. K. Strong, Jr., George Peabody College for Teachers, Nashville, Tenn.; Council for two years, Professor Patterson Wardlaw, University of South Carolina, Columbia, S. C.; Council for three years, Dean J. C. Barnes, Maryville College, Tenn., and Professor E. E. Rall, University of Tennessee, Knoxville, Tenn.

4. The following were elected to membership: Miss Buford Johnson, Johns Hopkins University; Dr. and Mrs. H. W. Odum, University of Georgia, Athens, Ga.; Dr. Walter B. Swift, Boston, Mass.; and Professor Goodrich C. White, Emory College, Oxford, Ga.

5. The accounts of the treasurer were audited by a committee of the Council and showed a balance on hand, December 30, 1915, of \$90.18.

L. R. GEISSLER,  
*Secretary-Treasurer*

UNIVERSITY OF GEORGIA,  
ATHENS, GA.

The following abstracts of papers were received:

#### ADDRESS OF THE PRESIDENT

*Academic Progress of Psychology in the South.*<sup>1</sup> J. C. BARNES,  
Maryville College, Tenn.

The purpose of this study was to show the academic progress of psychology in the South from 1905 to 1915. Two questionnaires, one of which pertained to the situation in 1905 and the other to that of 1915, were sent to each of sixty universities, colleges and normal schools of the South. Forty replies were received, and the catalogs of the institutions were studied.

The replies indicate that there were only two professorships of psychology in the South in 1905; and only two well equipped laboratories. A majority of the higher institutions of learning offered only three semester hours of psychology; a few of the larger universities gave an introductory course of six semester hours, followed by one or more advanced courses; only two universities were doing graduate work in psychology. One half of the institu-

<sup>1</sup> This address will appear in full in the *Psychological Review*.



tions reported psychological libraries, four fifths of which contained fewer than one hundred volumes, and one fifth from one hundred to two hundred volumes. Two institutions reported psychology as a separate department. Three fourths of the institutions listed the courses in psychology under philosophy, and one fifth under education. Salaries varied from twelve hundred to twenty-five hundred dollars.

The decade from 1905 to 1915 has been one of rapid progress in the academic status of psychology. Psychological libraries and laboratories are provided, but only a few of the institutions have separate professorships of psychology.

Seventy-five per cent. of the institutions offer a first course in psychology of three semester hours, twenty per cent. give a first course of six semester hours, one half of the institutions require the first course in psychology for graduation; one fourth require the first course for students in the department of education; one-fourth make psychology elective. Advanced courses are given in practically all of the institutions replying; the universities and normal schools give a large number of special courses. Approximately twenty per cent. of the sixty institutions are giving graduate courses in psychology. Nineteen laboratories were reported, ten of which have more than one room; eight laboratories report equipment valued at fifteen hundred dollars or more; two at six thousand dollars each. Ten institutions reported regular annual appropriations for the psychological laboratory from one hundred to one thousand dollars. With one exception the size of the laboratory classes ranges from six to ten. One fourth of the institutions report psychological libraries containing fewer than one hundred volumes, with an average between one and two hundred volumes. One half of the institutions take from one to ten psychological periodicals, two report over ten and two over twenty periodicals. Salaries vary from twelve hundred to three thousand dollars, the average salary being eighteen hundred dollars. One half of the institutions report research.

The progress of psychology in the South has been rapid during the past decade and the outlook for the future is very encouraging.

*The Consciousness of Self in Recent Psychological Literature.* L. R. GEISLER, University of Georgia.

This paper presents mainly in review form the position of Th. Ziehen, with regard to the consciousness of self and his relation to

recent discussions of that problem in the American psychological literature by such authors as Calkins, Curtis, Dunlap, Gamble, and Titchener. Ziehen's view is most closely related to Dunlap's view of the self as against his hypostatization of a transcendental ego. Ziehen defines the self merely as an individual collective concept characterized by four peculiarities, to which no separately existing entity corresponds. We have no more right to hypostatize these four characteristics into a separate existence than we have to assume the existence of a special national soul or of a mob-mind.

Ziehen compares his conception of the self to that of a river whose relatively constant bed indicates the relative constancy of the self-complex, and whose cross-section at any place would represent the momentary condition of this self-complex or soul. The term self or ego or I signifies the mere fact that the sensations and ideas of a human being form a collective system, in which they are characterized by special interconnections, just as the drops of water in a river are more closely interrelated than the individual rain-drops. Yet nobody would nowadays seriously try to hypostatize this greater closeness of relations into a separate existence.

The writer's own contribution to this controversy about the consciousness of self consists in the first place in pointing out that one form of this self is the reference to the whole group of mental processes occurring on the lowest level of attentional vividness. This group is usually said to be composed of mainly kinæsthetic and organic sensations, but at times it may also consist of highly complicated ideational processes. The reference is to the whole group of these background processes as such, not to individual processes in that group, whose lability is usually overlooked in the casual introspections of Calkins's "plain man." The four characteristics attributed by Calkins to the self may just as correctly be applied to this background as a whole. A further suggestion is that a detailed study of the ontogenetic development of the consciousness of self from earliest infancy promises to cast considerable light on this important problem and should antecede further controversial discussion.

*When Is Knowledge Organized?* W. C. RUEDIGER, George Washington University.

The factors involved in the thorough comprehension of a topic, and therefore in knowledge when organized, appear to be reducible to the following outline:

I. From the standpoint of the particular.

1. Classification.
  - (a) Logical.
  - (b) Analogous—likeness and difference.
2. Function.
  - (a) Humanistic.
  - (b) Natural—scientific.
3. Description—static, giving sensory qualities.
4. Description—genetic, tracing development.

II. From the standpoint of relations.

1. Cause—reference to explanatory principle.
2. Operation of cause.
  - (a) Under different conditions—natural laws.
  - (b) In concrete applications.
  - (c) Giving rules and directions of control.
3. Location in space.
4. Location in time.

Each of these factors may be applied to the particular as a whole or to each of its parts, or to both in succession.

*Scientific School Organization.* C. S. FOSS. (Reported by the Secretary.)

The author described in some detail with lantern illustrations the recently established scientific school organization in the School District of Reading, Pa., instituted with the help of the new Bureau of Research and Efficiency, according to the Courtis standards. This plan involves the following main topics: (1) Organization and government of school districts; (2) accounting, statistics and forms, their revision and amplification; (3) teaching, with special regard to simplification of records and reports, rating of teachers, and examinations; (4) pupils, their promotion and retardation and its causes; (5) instruction, with special regard to the courses of study, vocational schools, and continuation schools. The author pointed out how the introduction of a scientific organization into school systems increased their efficiency enormously.

*Questionnaire Results on Terms in Psychology.* K. DUNLAP, Johns Hopkins University.

*The Developmental Psychology of the Stutterer.* W. B. SWIFT, Boston, Mass.

This paper presented the reasons for new treatment, the researches that indicate that a new treatment is necessary, and finally a short outline of that treatment.

The reason for initiating certain developmental psychological processes in the stutterer is based upon the recent finding that the visualization processes are at fault during speech. The sum and substance of this is that when a stutterer is in trouble he lacks a visual picture. This finding and the research that led to it were published in the *Journal of Abnormal Psychology*, October, 1915.

Another recent research covered the contents of consciousness outside of the limited field of visualization processes and showed that they consisted mostly of associative memory things that gave no hint of subconscious complexes or seemed to demand any such complex for their explanation.

The present paper shows that therefore the *treatment indicated* is to supply the visualization processes that are lacking. The accomplishment of this was done by efforts along the line of developmental psychology, and the reader succeeded in the development in the stutterer of certain processes of visualization.

*Further Psychological Analysis of Stuttering.* W. B. SWIFT, Boston, Mass.

A first paper revealed unsatisfactory subconscious data to explain stuttering. A second paper presented an analysis of the conscious side of stuttering and showed the constant factor of the absence of visualization process as the background and cause of stuttering. Hence the name visual center asthenia. This, the third paper, analyzes all the other conscious content of stuttering and finds a sequence of events, memory, fear, functional slump, stutter, residual proneness, as the contents. The analysis finds no need and no hint of a subconscious complex, confirms the second paper, and denies the Freudian concept.

*Motion Models, Their Use in the Transference of Experience and the Presentation of Comparative Results in Educational Methods.* F. B. GILBRETH, Providence, R. I. (Reported by the Secretary.)

The motion model, of which the author presented several samples, is a wire representation of the path of a motion. By means of many lantern illustrations the author showed how through the use of the chronocyclegraph method satisfactory records of a motion path may be obtained, which present in one picture the relative time, the exact absolute time, the relative speed, the exact absolute speed, and the direction of all motions in three dimensions.

The wire motion model is an exact copy of the chronocyclegraph record in permanent, three-dimensional form. It has many valuable advantages. It assists in visualizing the motion path, which can be viewed from many different angles, as the chronocyclegraph record cannot be viewed thus. This visualizing process is often sufficient as a stimulus to motion economy and to invention. It can better than anything else impress its user with the reality and value, especially the time and money value, of useful and useless motions. It helps in the analysis of complicated curves of motion paths. The expert can use the motion model to learn the existing motion path and to discover possible lines of improvement, both in the technique of performing the motion and in the machinery employed. To the beginner the motion model is a standard of what he is to do, how it is to be done, and how fast it is to be done. In addition to all these points, the motion model is of course a perfect and permanent record of the motion performed.

*On the Psychology of Religious Myths.* W. T. SHEPHERD, Waynesburg College.

The paper is a report of a brief study of typical myths of different primitive peoples, in numbers deemed sufficient to warrant inductions, as to the mental factors and forces involved in the genesis of such myths. The results obtained by a study of myths in general are applied to religious myths in particular. The Homeric, Hesiodic and other Greek myths are considered; the Scandinavian myths and the myths of other ancient and modern primitive peoples are likewise taken into account.

From a psychological analysis of myths such as above mentioned, the reader concluded: In the class of explanatory myths (1) the principal mental factors in their genesis have been primitive imagination or fancy and primitive credulity, and (2) the principal mental forces impelling to their genesis were curiosity and wonder; in the class of entertainment affording myths, (1) the chief mental factors have again been imagination and credulity, and (2) the impelling mental forces to the formation of the latter class of myths have been a universal desire in man for entertainment, and a purpose, conscious or unconscious, in poets and other myth makers to cater to such a desire.

*A Survey of the Gary Schools and Pre-Vocational Schools in New York City.* B. R. BUCKINGHAM, New York City.



*The Effect of Humidity on Nervousness and on General Efficiency.*

L. STECHER, Commission on Ventilation, New York.

*School Surveys.* E. F. BUCHNER, Johns Hopkins University.

*Hypnotic Analogies and the Interpretation of Dreams.* V. MOORE,

Catholic University of America.

### NOTES AND NEWS.

PROFESSOR KATE GORDON, of Bryn Mawr College, has been appointed assistant professor of psychology in the Carnegie Institute of Technology.

DR. THOMAS V. MOORE, instructor in psychology in the Catholic University of America, has opened as an integral part of the psychological department of that University a psychiatric clinic, with special reference to the needs of backward children, at Providence Hospital, Washington, D. C.

THE following items have been taken from the press:

PROFESSOR WILLIAM STERN, of Breslau, has received a call from Hamburg.

PROFESSOR H. GROSS, editor of the *Archiv für Kriminal-Anthropologie und Kriminalistik*, has died at Graz at the age of 67.

OSWALD KÜLPE, professor at the University of Munich, has died at the age of 53, after a brief illness.

